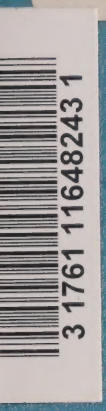

THE CANALS OF CANADA

Under the Jurisdiction of

THE DEPARTMENT OF TRANSPORT

1953

Published by Authority of

THE HON. LIONEL CHEVRIER, P.C., Q.C., M.P.

Minister of Transport

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OTTAWA • EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
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NOTES

Vessel Clearances

Throughout this pamphlet the dimensions, depth of water on the sills of locks and the depths, draughts and minimum overhead clearances in the various reaches are given for normal conditions. During high water the overhead clearances are decreased and during low water the draughts available are decreased. Changes in draughts available are made public by "Notices to Mariners" issued from time to time by the Marine Services of the Department.

The locks on some canals are narrower at the bottom than at the water surface. Some locks have a lift-wall in front of the upper gates which limits the length of vessels which can be accommodated. The lock diagrams at the end of this pamphlet illustrate in more detail what those limitations are for each canal.

Cases where doubt exists with respect to draught, length, beam, clearance, etc., should be referred to the Superintending Engineer of the canal concerned or to the Director, Canal Services, Department of Transport, Ottawa.

Regulations

When navigating any of the Canals of Canada masters and pilots should be in possession of a copy of the "Canal Regulations", which may be obtained at any Canal office or from the Director, Canal Services, Department of Transport, Ottawa.

THE CANALS OF CANADA

The network of waterways with which Canada is interlaced has always been one of her greatest transportation assets, but to realize upon that asset and weld the network into a connected system the lakes and rivers must be supplemented by canals to surmount rapids and waterfalls.

Canada's canals are concentrated almost entirely in the St. Lawrence River basin. The most important of these are on what is called the Main Route, along the St. Lawrence River and through the Great Lakes. The building of the canals on this route provided a navigation channel from the Atlantic Ocean to the western end of Lake Superior which was probably the principal factor in the creation of the great industrial areas along this waterway on both sides of the International Boundary.

Three other routes lie in the St. Lawrence basin, while another, with one lock only, is on the Atlantic coast. All five routes are under the administration of the Canal Services of the Department of Transport, and may be summarized briefly as follows:—

I.—*Main Route. Ocean traffic plies the St. Lawrence to Montreal, from whence, by canal, lake and river this route extends* 1,215 *miles farther inland to Port Arthur and Fort William at the head of Lake Superior and comprises the following sections:—*

—	No. of Locks	Normal draught	Miles of	
			Canal	Lake or River
Strait of Belle Isle and River St. Lawrence	.....	35′ 0″	.....	1,003·0
1. Lachine Canal—Montreal to Lachine	5	14′ 0″	8·74	.....
Lake St. Louis and River St. Lawrence	.....	.....	.....	16·0
2. Soulanges Canal—Cascades to Coteau Landing	5	14′ 0″	14·67	.....
Lake St. Francis and River St. Lawrence	.....	.....	.....	31·0
3. Cornwall Canal—Cornwall to Dickinson Landing	6	14′ 0″	11·00	.....
River St. Lawrence	.....	.....	.....	4·7
4. Farran Point Canal	1	16′ 0″	1·28	.....
River St. Lawrence	.....	.....	.....	9·5
5. Rapide Plat Canal	2	14′ 0″	3·89	.....
River St. Lawrence	.....	.....	.....	4·0
6. Galop Canal—Iroquois to Cardinal	3	14′ 0″	7·36	.....
River St. Lawrence and Lake Ontario	.....	.....	.....	229·0
7. Welland Ship Canal—Port Weller to Port Colborne	8	23′ 6″	27·60	.....
Lake Erie, Detroit River, Lake St. Clair, River St. Clair, Lake Huron and St. Mary River	.....	20′ 6″	.....	575·0
8. Sault Ste. Marie Canal	1	18′ 3″	1·38	.....
Lake Superior to Port Arthur or Fort William	.....	.....	.....	270·0
Totals	31	.....	75·92	2,142·2
Total distance = 2,218 Statute miles.				

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For intermediate distances on the above route reference may be made to the tabular statement on page 00. The following comparative distances are of interest in grasping the full significance of this navigation route in international and world trade:—

Montreal to Fort William and Port Arthur	1,215 statute miles
Montreal to Duluth	1,337 statute miles
Montreal to Chicago	1,244 statute miles
Montreal to Liverpool via Belle Isle strait	2,760 nautical miles
Montreal to Liverpool via south of Newfoundland	2,966 nautical miles
New York City to Liverpool	3,074 nautical miles

II.—*Atlantic Ocean to Bras D'or Lakes, Cape Breton Island*

St. Peters Canal—0·50 statute miles with one tidal lock—depth: 18 feet on the sills at lowest tide.

III.—*Montreal to Lake Champlain and New York City*

—	No. of Locks	Normal draught	Miles of	
			Canal	Lake or River
St. Lawrence River, Montreal to Sorel	.....	35′ 0″	.....	46
Richelieu River, Sorel to St. Ours	.....	12′ 0″	.....	14
1. St. Ours Canal	1	12′ 0″	0·12	.....
Richelieu River, St. Ours to Chambly Basin	.....	6′ 0″	.....	32
2. Chambly Canal—Chambly to St. Johns	9	6′ 6″	11·78	.....
Richelieu River, St. Johns to International Boundary	.....	6′ 0″	.....	22
United States Waterways—				
Lake Champlain, International Boundary to Whitehall	.....	.....	.....	112
1. Champlain Canal—Whitehall to Waterford	12	12′ 0″	62·86	.....
2. Erie Canal—Waterford to Troy	1	12′ 0″	2·45	.....
Hudson River, Troy to New York Harbour	.....	.....	.....	152
Totals	23	.....	77·21	378
Total distance = 455 Statute miles (126 miles in Canada)				

IV.—*Montreal to Kingston by Way of Ottawa*

—	No. of Locks	Normal draught	Miles of	
			Canal	Lake or River
1. Lachine Canal—Montreal to Lachine	5	14′ 0″	8·74	.....
Lake St. Louis	.....	.....	.....	13·5
2. Ste. Anne Canal	1	9′ 0″	0·12	.....
Lake of Two Mountains and Ottawa River	.....	.....	.....	27·0
3. Carillon Canal	2	9′ 0″	0·94	.....
Ottawa River	.....	.....	.....	6·2
4. Grenville Canal	5	9′ 0″	5·94	.....
Ottawa River to Ottawa	.....	.....	.....	56·0
5 Rideau Canal, Ottawa to Kingston	47	5′ 6″	17·72	105·8
Totals	60	.....	33·46	208·5
Total distance, Montreal to Kingston = 242 Statute miles.				
5. *(a)*—Branch of Rideau Canal:				
Tay Branch to Perth	2	5′ 6″	3·50	3·3

V.—*Lake Ontario to Georgian Bay*

—	No. of Locks	Normal draught	Miles of	
			Canal	Lake or River
1. Murray Canal—Presqu'ile Bay to Bay of Quinte	.....	9′ 6″	7·53	.....
Bay of Quinte from Murray Canal to Trenton	.....	.....	.....	3·0
2. Trent Canal				
Trenton to Lock 19, Peterborough	18	6′ 0″	8·75	80·0
Lock 19 Peterborough to Swift Rapids	24	6′ 0″	24·50	111·2
Swift Rapids and Big Chute Marine Railways	*	4′ 0″	.....	8·0
Big Chute to Georgian Bay at Port Severn	1	6′ 0″	.....	8·1
Totals	43	.....	40·78	210·3
Total distance, Presqu'ile Bay to Port Severn = 251 Statute miles.				
Branches of Trent Canal:				
Buckhorn Lake to Bridgenorth	0	.....	.....	9·0
Sturgeon Lake to Lindsay	1	6′ 0″	0·10	9·9
Lindsay to Port Perry	0	4′ 0″	.....	25·0

After allowing for duplications these routes cover a total distance of 3,166 statute miles, of which 2,837 miles are in Canada. Of the total mileage in Canada, 157·42 miles are through artificial channels and the remainder through river or lake, most of which is very little changed from its natural condition. However, a number of channels through lakes have required dredging to provide the present depth of water and also considerable portions of river channels have been made navigable or have had their depths increased by raising their levels through the construction of dams.

The operation and maintenance of the above canals within Canada are under the jurisdiction of the Director, Canal Services, Department of Transport, Ottawa. The improvement of the reaches between and beyond them is under the jurisdiction of the Department of Public Works of Canada, except that the control of the St. Lawrence River below Montreal to the Seaboard and the improvement thereof are under the St. Lawrence Ship Channel Branch of the Department of Transport.

The Department of Public Works maintains and operates a dam and lock on the Red River at St. Andrews, near Selkirk, Manitoba, by means of which vessels from Lake Winnipeg are enabled to proceed up the Red River as far as Fargo, North Dakota.

The same department also maintains and operates a lock at Poupore, Quebec, which connects two stretches of navigation on the Lievre River, mainly for lumbering purposes.

The Ontario Department of Public Works, which built and for a number of years operated parts of the Trent Canal, also built and still operates three locks not included in the Trent system. Two of these are for tourist purposes, one at Port Carling in the Muskoka Lakes and the other near Huntsville. The third lock is on the Magnetawan River at Magnetawan and is for the assistance of lumbering operations in the district.

* Two Marine Railways.

All aids to navigation, such as buoys, lights, wharves, etc., in the canals under the control of the Department of Transport are provided and maintained by Canal Services, while on all other navigable Canadian river and lake channels they are under the control of the Marine Services of the Department of Transport except in cases where they are provided by local or private interests.

The canals on the St. Lawrence River limit the size of vessel which can use the Main Route. Lock 17 at Cornwall is the limiting lock. Its bottom width is 43 feet 8 inches; width at coping, 45 feet 0 inches; and it can only accommodate vessels up to 255 feet in length.

The Lachine, Soulanges, Cornwall, Williamsburg, Welland, and Sault Ste. Marie Canals are lighted and operated by electricity.

All canals are closed to navigation by ice in the winter months, but ice-breaking steamers are now employed to lengthen the season of navigation at Lake Superior and Georgian Bay terminals, on the St. Lawrence River below Montreal and on Lake St. Louis at the lower entrance to the Soulanges Canal. Only on the Main Route canals, however, are such measures taken to lengthen the season. On the other canals the official opening is deferred until the ice has practically disappeared, while on the Trent and Rideau Canals it is further delayed for reasons of economy, although arrangements may be made for the passage of vessels in special circumstances before or after the regular navigation season.

For a description of the river channels and directions for navigation between canals from Montreal up the Ottawa River to Ottawa, and on the St. Lawrence River between Montreal and Kingston, reference should be made to the "Quebec Harbour to Kingston Harbour" Pilot. For a similar description of the Canadian shores of the Great Lakes, refer to the "Great Lakes Pilot (Vol. 1) (Kingston Harbour to Sarnia)"; "Great Lakes Pilot (Vol. 2) (Lake Huron and Georgian Bay)"; "Great Lakes Pilot (Vol. 3) (Lake Superior)."

The text of each of these publications, insofar as it is based on earlier editions of "The Canals of Canada" and on other information concerning canals, which has recently become superseded, is subject to the later revisions occurring in this publication.

These (Pilot) publications are obtainable from the Canadian Hydrographic Service, Room B 369, No. 8 Temporary Building, Ottawa, Ont., upon payment of $1.50 for each volume.

Following is a short description of the navigation routes on which the canals, under the jurisdiction of the Director, Canal Services, Department of Transport, are situated, together with a short historical summary and further details with respect to distances and structures on each canal.

RIVER ST. LAWRENCE AND GREAT LAKES MAIN ROUTE

Except when the iceberg season drives them farther south, the shipping fleets of Europe come into the St. Lawrence through the Strait of Belle Isle. Standing off the rugged north coast of the Gulf they sail for 843 statute miles before they reach Quebec City, and for 160 miles additional to Montreal. Tidewater is left behind near Three Rivers, halfway between Quebec and Montreal.

In order to avoid the Lachine Rapids, the first bar to through navigation, upbound vessels of canal size enter the Lachine Canal near the upper end of Montreal Harbour. This canal is walled throughout and is provided with wharves and basins for the intensive industrial traffic which it nourishes, particularly on its lower reaches.

Leaving the canal at Lachine, vessels traverse the length of Lake St. Louis, an expansion of the St. Lawrence River, to the lower entrance of the Soulanges Canal, where one branch of the Ottawa River meets the St. Lawrence. The Soulanges Canal passes through a level and entirely agricultural section to surmount the Cascades, Cedars, and Coteau Rapids. At Coteau Landing the canal opens into Lake St. Francis, another expansion of the St. Lawrence, at the upper end of which the foot of the Cornwall Canal is reached at the City of Cornwall.

The Cornwall Canal also passes through agricultural lands close to the river bank. Along its upper reaches it skirts the Long Sault Rapids.

From the head of the Cornwall Canal the river is navigable to Lake Ontario except where the three Williamsburg Canals overcome short rapids. The lower rapid at Farran Point is navigable for downbound traffic. The canal is used for upbound traffic and is large enough to pass two full canal-size vessels at one lockage. The Rapide Plat Canal is used for upbound and part of the downbound traffic. The rapid at this point may be run safely by most vessels except during low water periods.

The third in this group is the Galop Canal used by upbound and some downbound traffic to pass the Iroquois, Cardinal, and Galop rapids. The Iroquois and Cardinal rapids may be run safely by downbound vessels, but the Galop is impassable for full canal draught vessels. Accordingly, near the foot of the latter, there is an additional river lock through which downbound vessels may pass out into the river.

Above the Galop Canal vessels proceed for 70 miles through the picturesque Thousand Islands of the Upper St. Lawrence into Lake Ontario. At the western end of Lake Ontario, 159 miles farther west, the Welland Ship Canal crosses the Niagara peninsula to surmount the barrier to navigation presented by Niagara Falls and Rapids. The Welland Ship Canal leaves Lake Ontario at Port Weller, crosses the rich garden land skirting the lake, climbs the steep Niagara escarpment, passes through the rapidly growing industrial regions around Thorold, Welland, and Port Colborne and enters Lake Erie at the latter point.

From Port Colborne there is an uninterrupted waterway through Lake Erie, Detroit River, Lake St. Clair, River St. Clair, Lake Huron, and the St. Mary River to Sault Ste. Marie. Branching off this route from Lake Huron there is an open lake route to the head of Lake Michigan, wholly through United States territory.

The St. Mary Rapids on the St. Mary River between Lakes Huron and Superior are overcome by the Sault Ste. Marie Canal at Sault Ste. Marie, Ontario, and by four parallel locks forming the St. Marys Falls Canal at Sault Ste. Marie, Michigan, on the opposite shore of the river.

From the head of these canals any port in Lake Superior may be reached. The twin ports of Port Arthur and Fort William form the Canadian terminus of the route but Duluth, Minnesota, is the farthest port from the ocean.

Following are more complete details with historical data concerning the several canals which make up the Main Route.

LACHINE CANAL

In 1680, Dollier de Casson, Superior of the Sulpicians, projected the construction of a canal which would connect Lachine with Montreal, by skirting Sault St. Louis Rapids or Lachine Rapids. The project provided for the excavation of a canal 12 feet wide and one mile long, without locks, from Lake St. Louis to Lac à la Loutre or Little Lake St. Pierre (no longer existing), as well as the deepening of Little River St. Pierre to its mouth on the St. Lawrence at Montreal. The depth of water in the canal was to be 18 inches at the lowest level of the St. Lawrence.

The project began in October, 1700, when Dollier de Casson granted a contract to a Montreal contractor for the construction of the "Canal de la Chine" section between Lake St. Louis and Lac à la Loutre. The work was discontinued in February 1701, following the bankruptcy of the contractor, when only a cutting of 3 to 4 feet remained to be completed over a length of about 800 yards. Owing to lack of money it was impossible to complete the project under the French Regime. This canal was probably used by canoes during high water periods.

The Government of Lower Canada, by Act approved on May 26, 1821, appointed a Commission which was entrusted with undertaking the construction of a canal between Lachine and Montreal. This project provided for a canal $8\frac{1}{2}$ miles long with 7 locks 100 feet by 20 feet and a water depth of 5 feet on the sills. The canal prism was to be 28 feet wide at the bottom and 36 to 48 feet at the water line.

Work began on July 17, 1821, and the canal was open to navigation in 1825.

In 1841, immediately following the union of the Provinces of Upper and Lower Canada, the Department of Public Works decided to enlarge the Lachine Canal and the other canals of the St. Lawrence Route, so as to meet the requirements of the Great Lakes traffic.

The enlargement project provided for 5 locks 200 feet by 45 feet, with a draught of 16 feet for locks 1 and 2 and part of the reach below St. Gabriel Lock and a draught of 9 feet for the remainder of the canal.

The three combined locks which formed the old lower entrance were superseded by two locks separated by Reach No. 1. These same locks, which were lengthened subsequently, form the present west Locks 1 and 2. The two old combined locks of Cote St. Paul were superseded by one lock, Lock 4, which is still in existence. Locks 3 and 5 were built almost opposite the old ones which still stand. Locks 3 and 4 are no longer used and old Lock 5 serves as a headrace for feeder weir No. 5.

The canal prism was widened and deepened so as to have a width of 80 feet at the bottom, 120 feet at the water line, and a minimum depth of 10 feet. The enlargement works began in 1843 and were completed in 1848.

Immediately after Confederation, the Federal Government decided to standardize the dimensions of the locks on the St. Lawrence Route according to a scale more consistent with the ever increasing requirements of Great Lakes vessels.

The plans provided for locks 270 feet by 45 feet, with a draught of 17 feet for Locks 1 and 2 and part of the reaches below Lock 3 and a draught of 14 feet for the remainder of the canal.

The enlargement works began in 1863. The new Locks 1, 2, 3 and 4 were built almost opposite the locks that were built in 1843–48; the guard lock at Lachine was built about 250 feet south of the old lock and a new upper entrance was built into Lake St. Louis.

The canal prism was enlarged so as to have a minimum width of 140 feet at the bottom and 150 feet at the water line.

The above project was completed in 1884. A few years later, the length of old Locks 1 and 2 was extended to 270 feet to conform with the other locks, without, however, changing the depth of the water on the sills. In 1913, a bascule bridge was erected over the canal at Rockfield. Guard gates were built in 1949–50 at the upper entrance to the canal. In 1950–51, the length of Lock 4 was extended to 308·0 feet to provide for the installation of wire rope fenders above the lower gates and below the upper gates.

The following applies to the present canal:

Length of canal	8·74 statute miles
Number of locks	5
Dimensions of locks (Except No. 4)	270 feet by 45 feet
Total rise of lockage	46·24 feet
Normal draught:	
East Locks 1 and 2	17 feet
North Locks 3 and 4 and South Lock 5	14 feet
Minimum width of canal at water surface	150 feet
Minimum width of canal at bottom	140 feet
Minimum overhead clearance	94.8 feet (Lift Bridge)

The canal extends from Montreal Harbour to Lake St. Louis at the city of Lachine, overcoming the Lachine Rapids, the first obstruction to halt vessels ascending the St. Lawrence River.

Between Locks 1 and 2 the canal is divided into two channels, each of which is provided with a wide basin, along the walls of which vessels may tie up out of the navigation lane for loading and unloading. The reach between Locks 2 and 3 is also well supplied with wharfage basins out of the main channel in order to concentrate wharf facilities close to the business section of the city. Above Lock 3, however, business is not so intensive and vessels are allowed to moor along the canal walls at various places for loading and unloading.

In the lower part of the canal 17-foot navigation is available as follows:

In East Lock 1 and East Basin 1,—when the gauge at the downstream end of Lock 1 reads 17·25 or higher. At lower readings the available draught is reduced correspondingly.

Through East Lock 2 and along the east and south walls of Basin 2 to 500 feet below Lock 3, including Wellington Basin; also along the west wall of Basin 2 from Lock 2 to Colborne Street.

West Locks 1 and 2 are two feet shallower than the new locks on the east side. Old Locks 3 and 4, situated on the south side of the canal, are no longer used for navigation.

The electricity required for the operation of the structures and shops, as well as for the lighting of the whole canal zone, is supplied by Quebec Hydro-Electric Commission. The canal has its own power plant however, immediately south of Lock 4, by which all the required electrical power may be supplied should there occur any interruption in the service provided by Quebec Hydro.

From the head of the Lachine Canal to the foot of the Soulanges Canal the distance is 16 miles and 13½ miles to the foot of the Ste. Anne Canal which has a normal controlling navigation depth of 9 feet.

Lachine Canal—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught	Lift
	Montreal Harbour—Standard low level, 18·99 above M.S.L.				
		ft. in.	ft. in.	ft. in.	ft.
0·00	Montreal Harbour—Mouth of Entrance Channel—				
0·04	East Lock 1	270 0	45 0	17 0	12·96
0·04	West Lock 1	270 0	45 0	15 0	.....
0·10	Basin No. 1				
0·21	East Lock 2	270 0	45 0	17 0	13·50
0·21	West Lock 2	270 0	45 0	15 0	.....
0·28	Bridge 1—Prince Street—Black's Bridge—Swing				
0·47	Basin No. 2				
0·61	Bridge—Can. Nat. Rys.—Lift				
0·65	Bridge—Can. Nat. Rys.—Swing				
0·67	Tunnel—Vehicular—Wellington Street				
0·76	Tunnel for water pipes—M.W.W.				
1·16	North Lock 3—"St. Gabriel"	270 0	45 0	14 0	9·02
1·23	Bridge 3—Seigneurs Street—Swing				
1·70	Bridge 4—Charlevoix Street—Swing				
1·85	Bridge 5—Atwater Avenue—Swing				
1·93	Tunnel—Vehicular—Atwater Avenue				
2·07	Bridge—Can. Nat. Rys.—Swing				
2·45	Siphon culvert—St. Pierre River				
2·65	Tunnel—Vehicular—St. Remi Street				
2·99	North Lock 4—"Cote St. Paul"	308 0	45 0	14 0	9·26
3·27	Bridge 6—Cote St. Paul Road—Swing				
3·45	Siphon culvert				
6·27	Bridge 7—Rockfield—Highway bascule				
6·85	Bridge—Can. Pacific Ry.—Rockfield—Swing				
7·50	Lock 5—Lachine	270 0	45 0	14 0	1·50
7·56	Bridge 8—Lower Lachine Road—Swing				
8·74	Lake St. Louis—Mouth of entrance channel				
	Total lift	.....	.....	.....	46·24

The draught at Lock 1 varies with the level of Montreal Harbour and at Lock 5 with the level of Lake St. Louis. During navigation seasons the depth of water on the sills of these locks has been as low as 13·08 feet at Lock 1 (Nov. 17, 1934) and 12·25 feet at Lock 5 (Nov. 11, 1934). The highest water level recorded at Lock 1 has been 45.25 feet (April 18, 1886) and at Lock 5, 22·20 feet (May 13, 1943).

SOULANGES AND BEAUHARNOIS CANALS

In 1779, the Royal Engineers, at La Faucille, Trou-du-Moulin, Split Rock and Coteau Rapids, undertook the construction of four canals to overcome the numerous rapids between Lake St. Louis and Lake St. Francis. The construction of the first canal, at Coteau Rapids, began in 1779 and was completed in 1783; this canal was 900 feet long and 7 feet wide and had three locks. In 1782 and 1783, a lock was built at Split Rock; subsequently a canal 120 feet long by 6 feet wide, without locks, was built at Trou-du-Moulin, and finally a canal 410 feet long by 6 feet wide, with one lock, was built at Rapide à La Faucille above Cascades Point. As a whole, this series of locks and canals provided a total rise of about 15 feet and the available draught barely exceeded 2 feet.

Due to damage caused by ice each spring, the Royal Engineers were forced to abandon the canals of Trou-du-Moulin and Rapide à La Faucille and to replace them by one canal, the Cascades Canal, built in a more convenient place, at the foot of Cascades Rapids. This new canal was 1,500 feet long and included two locks 120 feet by 20 feet at the lower entrance, and guard gates at the upper entrance. At about the same time, Split Rock Canal, as well as that at Coteau Rapids, were enlarged and improved.

The Cascades Canal was opened to navigation in 1805, but certain improvement works at Cascades, Split Rock and Coteau Rapids were not completed until 1817. This series of canals provided a draught of about $3\frac{1}{2}$ feet.

Beauharnois Canal

In 1841, immediately following the union of the Provinces of Upper and Lower Canada, the board of Public Works decided to enlarge all the canals along the St. Lawrence Route in order to meet the requirements of the Great Lakes traffic. The enlargement project, like that of the Lachine Canal, provided for locks 200 feet by 45 feet, with a water depth of 9 feet on the sills.

Following numerous discussions, the Board of Works decided to abandon the old canals on the north shore of the St. Lawrence and to build a new canal on the south shore between Beauharnois and Valleyfield. Work began in 1842 and was completed in 1845. A few years later, to increase the depth of the water at the upper entrance to the canal, two dams were built, one extending from the main shore to Grande Ile, the other from Grande Ile to Clark's Island. The Hungry Bay dyke was also built along the low-lying southern shore of Lake St. Francis.

Soulanges Canal

Immediately after Confederation, the Federal Government decided to standardize the dimensions of the locks of all the canals along the St. Lawrence Route. The project provided for locks 270 feet by 45 feet, with a depth of 14 feet on the sills.

Instead of enlarging the Beauharnois Canal located on the south shore, it was decided by the Government to build a new canal with locks 280 feet by 46 feet on the north shore of the river between Cascades Point and Coteau Landing. Construction works for this new canal, called the Soulanges Canal, were begun in 1892 and completed in 1899.

SOULANGES CANAL

Length of canal	14·67 statute miles
Number of locks	5
Guard gate	1
Dimensions of locks	280 feet by 46 feet
Total rise of lockage	83·50 feet
Normal draught	14 feet
Breadth of canal at bottom	96 feet
Breadth of canal at water surface	160 feet
Minimum overhead clearance	135 feet (transmission lines)

The canal power house, about midway between Locks 4 and 5, supplies all electricity for lighting the canal zone, and for operating the bridges, locks and shops.

From the head of the Soulanges Canal to the foot of the Cornwall Canal the distance through Lake St. Francis is 31 miles, navigable for vessels drawing 14 feet.

Soulanges Canal—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught on sills	Lift
		ft. in.	ft. in.	ft. in.	ft.
0·00	Lake St. Louis—Mouth of Entrance channel				
0·25	Lock 1—Cascades Point	280 0	46 0	15 0	23·50
0·52	Lock 2—Cascades Point	280 0	46 0	15 0	23·50
0·89	Lock 3—Cascades Point	280 0	46 0	15 0	23·50
0·95	Bridge 1—Quinze Chiens Road—Swing				
1·92	Culvert—Bissonette Gully				
2·86	Bridge 2—St. Antoine Road—Swing				
3·38	Lock 4	280 0	46 0	15 0	12·00
3·57	Guard Gates				
5·60	Culvert—Valade Gully				
5·70	Bridge 3—St. Féréol Road—Swing				
8·00	Bridge 4—St. Dominique Road—Swing				
8·93	Culvert—Rivière à la Graisse				
9·04	Power house				
9·94	Bridge 5—St. Emmanuel Road—Swing				
11·25	Culvert—Rivière Rouge				
11·51	Bridge 6—Rivière Rouge Road—Swing				
11·96	Siphon Culvert—Rivière Delisle				
14·01	Bridge—Can. Nat. Rys—Swing				
14·03	Guard Lock 5	280 0	46 0	15 0	1·00
14·10	Bridge 7—Coteau Landing, Highway—Swing				
14·67	Lake St. Francis—Mouth of Entrance channel				
	Total lift				83·50

The draught at Lock 1 varies with the level of Lake St. Louis and at Lock 5 with the level of Lake St. Francis. During navigation seasons the depth of water on the sills of these locks has been as low as 14·00 feet at Lock 1 (Nov. 17, 1934) and 14·80 feet at Lock 5 (Nov. 10, 1934). The highest level recorded at Lock 1 has been 33·00 feet (Feb. 9. 1918) and at Lock 5, 19·00 feet (April 13, 1908).

CORNWALL CANAL

This canal was built to overcome the Long Sault Rapids and extends from the City of Cornwall to the Village of Dickinson Landing. It is 11 miles long.

In 1833, a commission was appointed to investigate navigation from Cornwall to the head of the Long Sault Rapids. It recommended the construction of the Cornwall Canal which was to be 100 feet wide at the bottom and the locks 200 feet by 45 feet and 9 feet of water on the sills. The canal was formally opened in June 1843.

In 1876 work was started to enlarge the canal with locks 270 feet by 45 feet and 14 feet of water on the sills. In 1904 the project was completed.

Length of canal	11·00 statute miles
Number of locks	6
Guard gates	1
Dimensions of locks	270 feet by 45 feet*
Total rise of lockage	48 feet
Normal draught	14 feet
Breadth of canal at bottom	90 feet
Breadth of canal at water surface	154 feet
Minimum overhead clearance	150 feet (transmission line)

The Cornwall Canal Repair Dock is situated between Old Locks 16 and 17, to the northward of the present Locks 15 and 17 at Cornwall. It covers an area of approximately two acres and will accommodate two large canal-size vessels with maximum draught of 12 feet, in addition to numerous smaller vessels. Access and egress are through Old Lock 17.

* Lock 17 is only 43 ft. 8 in. wide at the bottom and 45 ft. 0 in. wide at the coping. See lock diagram at end of this pamphlet.

The locks on this canal are electrically operated and the canal is lighted by electricity.

From the head of the Cornwall Canal to the foot of the Farran Point Canal the distance on the River St. Lawrence is $4\frac{3}{4}$ miles.

Cornwall Canal—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught on sills	Lift
		ft. in.	ft. in.	ft. in.	ft.
0·00	East entrance—Cornwall				
0·01	Lock 15—Cornwall	270 0	45 0	14 0	12·7
0·25	By-pass				
0·32	Lock 17	270 0	43 8	14 0	13·3
0·43	Culvert				
0·82	Bridge 1—Highway—Swing				
1·55	Culvert				
1·65	Lock 18	270 0	45 0	14 0	8·0
1·84	Bridge 2—N.Y.C.R.R. and highway—Swing				
3·16	Lock 19	270 0	45 0	14 0	6·0
4·06	Culvert				
4·76	Lock 20	270 0	45 0	14 0	8·0
5·04	Guard gate				
5·99	Bridge 3—Highway—Swing				
10·38	Guard Lock 21	270 0	45 0	14 0	0·0
11·00	West entrance—Dickinson Landing				
	Total lift				48·0

When the St. Lawrence is low, draughts available at locks opening on the river are curtailed. During navigation season the depth of water on Lock 15 mitre sill has been as low as 12·8 feet and on Lock 21 as low as 12·3, both in November, 1934.

WILLIAMSBURG CANALS

The Farran Point, Rapide Plat, and Galop Canals are collectively known as the Williamsburg Canals.

Farran Point Canal

This canal enables vessels ascending the river to avoid the Farran Point Rapids. Two canal-size vessels may be locked at the same time. Descending vessels run the rapids with ease and safety.

The construction of the canal was commenced in 1844 and completed in 1847. It included one lock 200 feet by 45 feet with 9 feet of water on the sills.

In 1897 the canal was extended and a lock 800 feet by 50 feet with 16 feet of water on the sills was constructed. The lock was put into use in September 1899. In 1913 the whole canal was completed.

Length of canal	1·28 statute mile
Number of locks	1
Dimensions of lock	800 feet by 50 feet
Total rise of lockage	4 feet $2\frac{1}{2}$ inches
Normal draught	16 feet
Breadth of canal at bottom	80 feet
Breadth of canal at water surface	154 feet
Minimum overhead clearance	No restrictions

The canal is electrically operated and lighted.

From the head of Farran Point Canal to the foot of Rapide Plat Canal there is a navigable stretch of $9\frac{1}{2}$ miles in the St. Lawrence River.

Rapide Plat Canal

The canal was constructed to enable vessels ascending the river to pass the Rapide Plat. Descending vessels run the rapids safely, except at extreme low stages of the St. Lawrence River, when downbound vessels of full canal draught must use the canal.

The first canal was built between the years 1844 and 1847. The locks were 200 feet by 45 feet with 9 feet of water on the sills.

The second canal was constructed between 1884 and 1904. The Lift Lock was enlarged to 285 feet by 45 feet and the Guard Lock was enlarged to 270 feet by 45 feet with 14 feet of water on the sills.

Length of canal	3·89 statute miles
Number of locks	2
Dimensions of locks—	
Lock 23	285 feet by 45 feet
Guard Lock 24	270 feet by 45 feet
Total rise of lockage	11 feet 7¼ inches
Normal draught	14 feet
Breadth of canal at bottom	80 feet
Breadth of canal at water surface	154 feet
Minimum overhead clearance	No restrictions

The canal is electrically operated and lighted.

From the head of the Rapide Plat Canal to Iroquois, at the foot of the Galop Canal, the River St. Lawrence is navigable for 4 miles.

Galop Canal

The first canal in two sections, one at Cardinal and one at Iroquois, was built between the years 1844 and 1846 and provided 9 feet draught.

The Junction canal was built between the years 1849 and 1851 along the river bank to connect the two original sections and to increase the draught at Iroquois.

The Canal was enlarged to 14 feet draught between the years 1888 and 1904.

Length of canal	7·36 statute miles
Number of locks	3
Dimensions of locks—	
Lift lock at foot of canal—No. 25	800 ft. by 50 ft.
Guard Lock at head of Canal—No. 27.	270 ft. by 45 ft.
River lock to pass vessels around Galop Rapids only—No. 28	326 ft. 9 ins. by 45 ft.
Total rise of lockage	15 ft. 5½ inches.
Normal draught	14 ft.
Breadth of canal at bottom	80 ft.
Breadth of canal at water surface	144 ft.
Breadth between walls in Cardinal cut	88 ft.
Minimum overhead clearance	No restrictions

This canal enables vessels to overcome the rapids at Pointe aux Iroquois, Point Cardinal and the Galop.

The canal is lighted by electricity, and lock 25 and the Cardinal Bridge are electrically operated.

Less than a mile above the Galop Canal upper entrance, a vessel passes between two short dykes close to the north shore, which direct its course into the 300-foot wide North Channel, cut through a point on the mainland and through Drummond and Spencer islands. Southwesterly from the latter island the "North Channel Dyke", 3,300 feet long, protects the course into safe water.

From the head of the North Channel to the lower entrance of the Welland Ship Canal the distance is 229 miles. The course lies through the Thousand Islands section of the upper St. Lawrence and along Lake Ontario.

Williamsburg Canals—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught	Lift
		ft. in.	ft. in.	ft. in.	ft.
	Farran Point Canal				
0·00	East entrance—Farran Point Village				
0·11	Lock 22—Farran Point	800 0	50 0	16 0	4·21
1·28	West entrance				
	Total lift				4·21
	Rapide Plat Canal				
0·00	East entrance—Farlingers Bay, Morrisburg				
0·19	Lock 23—Morrisburg	285 0	45 0	14 0	11·60
1·59	Statas Bay				
1·76	Mariatown				
2·80	Heagles Bay				
3·67	Lock 24—Guard Lock	270 0	45 0	14 0	.....
3·89	West entrance—Flaggs Bay				
	Total lift				11·60
	Galop Canal				
0·00	East entrance—Iroquois Village				
0·21	Lock 25—Iroquois	800 0	50 0	14 0	15·46
0·34	Bridge 4—Highway—Swing				
5·25	Bridge 5—Can. Nat. Rys. and highway—Swing				
5·83	Gates Bay				
6·42	Lock 27—Guard Lock	270 0	45 0	14 0	.....
6·42	Lock 28—River Lock	326 9	45 0	14 0	(6·0)
7·36	West entrance to canal				
8·19	Dyke				
8·64	Entrance to North Channel				
9·89	West end of North Channel dyke				
	Total lift				15·46

At low water stages of the St. Lawrence, draughts available at most locks opening into the river are curtailed. During navigation seasons the depths of water on the river gate mitre sills have been as low as the following, all in November, 1934:

Lock 22 — 13·8 feet
Lock 23 — 12·6 feet
Lock 24 — 11·8 feet
Lock 25 — 14·1 feet
Lock 27 — 12·2 feet
Lock 28 — 11·3 feet

WELLAND CANALS

Previous to the construction of the First Welland Canal, all freight had to be transported overland from Queenston on the Niagara River to the mouth of Chippawa Creek above Niagara Falls. This portage was considered of such importance that it was controlled by a French military post as early as 1678. It passed into British hands in 1759. In 1764 a capstan incline was built on the east side of the Niagara River to the top of the escarpment, 325 feet high, from which a wagon portage, about 6 miles long, was used to carry bateaux and merchandise to the head of the Falls. Tolls were 10 pounds New York currency and upwards for each bateau.

Due to the foresight and energy of the late Honourable William Hamilton Merritt, the first canal was commenced in 1824 by a private company called the Welland Canal Company. It provided 8 feet draught.

On November 30, 1924, a cairn was unveiled at Allanburg marking the spot where, one hundred years before, the first sod of the original Welland Canal was turned by George Keefer, first President of the Welland Canal Company.

From Port Dalhousie, on Lake Ontario, the route of this canal followed the valley of Twelve Mile Creek to the summit level at Thorold, thence southerly to the Welland River at Port Robinson. From Port Robinson vessels descended the Welland River to its mouth at Chippawa and thence proceeded up the Niagara River to Lake Erie. This canal had 40 wooden locks, each 110 feet long, 22 feet wide with 8 feet of water on the sills. The summit level from Port Robinson to Allanburg was supplied from the Grand River above Dunnville by means of a Feeder Canal 27 miles long.

On November 20, 1829, the first two schooners, one British and one American, were taken through the canal from Lake Ontario to Lake Erie.

By 1833 the summit level was extended from Port Robinson to Port Colborne on Lake Erie, which port thereafter became the southern terminus of the canal.

Second Welland Canal

In 1841 the Legislature of Upper Canada purchased the canal and began to enlarge its capacity. By increasing the lifts, the 40 wooden locks were reduced to 27. The new locks were built of cut stone, each 150 feet long, 26 feet 6 inches wide, with the depth of water on the sills increased from 8 to 9 feet. The new canal was opened in 1845. It included an additional terminus on Lake Erie which utilized the Feeder Canal from Welland to Stromness and from there a new branch to Port Maitland at the mouth of the Grand River.

The section of the canal between the Feeder Canal junction at Welland and Port Colborne on Lake Erie was enlarged and opened for 9-foot navigation in 1850 but was still supplied with water by the Feeder Canal. Most of the locks of the Second Canal still exist and the channel from Thorold to Port Dalhousie is being used for power and drainage purposes.

In 1853, shortly after the completion of the Second Canal, the depth was increased to 10 feet by raising the banks and lock walls.

Third Welland Canal

Constructed by the Dominion Government for 12 feet draught by 1883 and increased to 14 feet draught by 1887, had its northern terminus at Port Dalhousie, from where the route extended in a southeasterly direction, climbing the escarpment at Thorold, and then generally following the route of the Second Canal to Port Colborne. The summit level of the canal was also deepened sufficiently in 1883 to permit most of the water supply for the canal to be obtained directly from Lake Erie.

Welland Ship Canal

This canal was constructed between 1913 and 1932 by the Dominion Government. Its northern or Lake Ontario terminus is located at Port Weller, about $7\frac{1}{2}$ miles westerly from the mouth of the Niagara River. From Port Weller the route follows the Ten Mile Creek Valley almost due south to Thorold and from here generally the route of the third Canal to Port Colborne.

WELLAND SHIP CANAL

Length of canal	27·60 statute miles
Number of locks	8
Dimensions of locks—	
Lock 1 (Port Weller)	865 feet by 80 feet
Locks 2, 3, 4, 5, 6 and 7	859 feet by 80 feet
Lock 8 (Guard Lock, Port Colborne)	1,380 feet by 80 feet
Guard Gates (Thorold)	1
Total rise of lockage	327 feet
Depth of water on lock sills	30 feet
Permissible maximum draught	23.5 feet
Depth of canal prism (generally)	25 feet
Breadth of canal prism at bottom	200 feet
Breadth of canal prism at surface of water	310 feet
Minimum overhead clearance	120 feet (Lift Bridges)

The Welland Ship Canal, crossing the Niagara Peninsula, overcomes the difference in level between Lake Ontario and Lake Erie represented by Niagara Falls and the Rapids in the Niagara River. It supersedes the former Third Welland Canal.

There are eight locks—seven lift locks located in the northerly third of the total length, at and below Thorold, and one guard lock about $1\frac{1}{2}$ miles north of the Port Colborne entrance. The lifts vary from 43·7 to 47·9 feet, aggregating 327 feet total lift. Locks 4, 5, and 6 are twin locks in flight, overcoming the steep rise between Merritton and Thorold known as the Niagara Escarpment, and permitting uninterrupted passage of upbound and downbound traffic.

The width of all locks is 80 feet but the length which may be occupied by vessels varies. The clear distance between stop signs is:—

Locks 1, 2, 3, 4	715 feet
Locks 5, 6, 7	717 feet
Lock 8	1,148 feet

The canal prism is 200 feet wide at the bottom and 310 feet at the water line. The locks were all constructed to give 30 feet of water over their sills and all concrete structures were constructed for this depth.

The canal reaches, between locks, were excavated to a depth of 25 feet. The permissible vessel draught is 23.5 feet.

The canal is crossed by twenty bridges, six of which are railway bridges and the remainder highway bridges.

The limiting overhead clearance of 120 feet is governed by the vertical lift bridges. The water level in Port Colborne Harbour varies substantially due to the direction and intensity of the wind and this affects the clearance which may prevail under vertical lift Bridges 20 and 21. The horizontal clearance throughout the canal is governed by the width of the locks.

Windbreaks.—To guard against cross winds, one of the greatest sources of delay to navigation of limited artificial waterways, an extensive reforestration program has been carried out along the banks of the Ship Canal. Vast numbers of trees native to the district have been planted and are now mature. They form a windbreak by the aid of which vessels may pass during any mood of the winds. In addition, their roots bind the earth embankments of the prism reaches, thus providing a greater measure of protection against the erosive action of the water.

Safety Features.—All controlling equipment for operating the valves, gates, fenders, and signals at each lock is so interlocked as to ensure the proper sequence of operation and thus guard against disaster to both locks and vessels.

Protection for the upper gates against upbound vessels is provided by heavy concrete lift-walls at all locks, except at Lock 8 where a wire rope fender is provided. Protection of these gates against downbound vessels is provided by wire rope fenders, except where a bridge crosses the upper entrance of the lock.

Protection of the lower gates against upbound and downbound vessels is provided by wire rope fenders, except at Lock 8 where protection against upbound vessels is provided by a single leaf bascule bridge.

Signs on the canal bank mark the locations of the many submarine cables crossing the canal prism.

All the locks and movable bridges are operated by electricity. Other structures and the canal shops are served by electric power and the entire canal zone is electrically lighted. The electricity is generated in the canal power house located below the twin flight locks. Auxiliary mechanical power is provided for the bridges by means of gas engines. Standby electrical service is provided by the Ontario Hydro-Electric Power Commission.

Port Facilities Along Canal

The Lake Ontario terminus of the canal is situated about $7\frac{1}{2}$ miles west of the mouth of the Niagara River. Vessels passing through from Lake Ontario encounter the following features of interest to navigators:—

Port Weller Harbour

The location of this harbour is shown on Canadian Hydrographic Service Chart No. 2042.

It is formed by two parallel embankments extending due north 7,500 feet into the lake. The embankments are about 250 feet wide at the top and are made of clay, with their inner and outer slopes protected with rock. The enclosed harbour throughout a length of 4,600 feet has a width of 800 feet at the bottom and 1,200 feet at the water line. Deep-draught vessels should give the shore lines of the harbour a clearance of 200 feet, as the slopes of the embankment below water surface have wide flat berms.

On each side of the harbour entrance there is a concrete pier 600 feet long, including the pierhead at its outer end. The centre line of the entrance bears due south, as does also that of the harbour for a distance of 7,000 feet from the entrance pierhead, at which distance the centre line deflects about 15° to the east so as to coincide with that of Lock 1, situated 2,500 feet farther on.

The entrance channel is 400 feet wide at its narrowest point, between the pierheads, and is 800 feet wide between the inner ends of the entrance piers. From a point 1 mile south of the pierheads, the 800-foot bottom width of the harbour decreases gradually to the 400-foot width between the wharf walls north of the lock. The depth in the entrance channel and for a distance of 2,000 feet south of the pierheads is 28·5 feet at low water (elevatoin 243·0); for the next 1,500 feet it is 27·5 feet, and thence to the lock entrance it is 25·5 feet.

For a distance of about 3,500 feet northward from the lock there is a concrete wharf wall along the west side of the harbour.

On the east side, between 6,000 and 7,000 feet from the entrance pierheads, there is a 1,000:foot concrete wharf wall. In the north end of this wall there is a gate lifter berth 200 feet square. For a distance of 700 feet south of the 1,000-foot wharf wall, there is, on the east side of the harbour, an earth slope protected by rock. To the south of this slope for 600 feet there is a concrete wharf with 12 feet of water alongside, the northern 350 feet only is available for the use of small vessels and tugs, the remainder is used as a spare gate berth. This wharf is set far back in the slope so that the small boats moored there are clear of the deep canal channel leading to the lock. Between the latter wharf wall and the raceway at the lock, the east side of the harbour is made of an earth slope faced with concrete.

Port Weller Dry Dock.—The dry dock is located approximately 800 feet upstream from Lock 1 and adjacent to the east bank of the pondage area. It can accommodate vessels up to 678 feet in length. The Port Weller Dry Docks Limited operate these facilities.

The canal administration building is situated on the west side of the canal abreast of Lock 1.

Port Weller Lights.—A flashing red light is located on the west pierhead at the entrance. The electric fog horn cycle is; blast 3 seconds, silence 9 seconds, blast 3 seconds, silence 45 seconds. In case of its failure, an electric fog bell sounds continuously. A flashing green light marks the outer end of the east embankment at the harbour entrance.

The Port Weller main light, showing a white flash every five seconds, visible 17 miles, is located on the west embankment or breakwater 3,000 feet from the outer pierhead. A radio-beacon is operated at this station. The pierhead and main lights do not mark the line of approach to the harbour and should not be used as a range.

St. Catharines

St. Catharines wharf is located on the west side of the canal between Locks 2 and 3, $\frac{3}{8}$ miles from Queen Elizabeth Way, which crosses the canal over Bridge 4 at Homer; usable length of wharf, 390 feet; depth alongside, 22 feet. There is a turning basin for vessels not exceeding 350 feet in length. A freight shed is located on this wharf.

Thorold

A turning basin for vessels up to 800 feet in length is provided immediately above Lock 7. The following wharves are located in the basin:

West Side.—Thorold Wharf—one-sixth miles from Provincial Highway 58. It is a public wharf offering a usable length of 800 feet and a 30-foot depth alongside. There is a rail connection with Canadian National Railways. Warehouse of Niagara District Warehouse and Forwarding Company is located at the south end of the wharf.

South Side.—North East of the Guard Gate is located the Ontario Paper Company Wharf No. 1—Usable length 530 feet; depth alongside 21 feet; built and equipped by the paper company for unloading pulpwood.

East Side.—Berthing accommodation $\frac{3}{4}$ mile from Provincial Highway 58; 1,900 feet in length; both sides of old Third Canal channel are available; depth 18 feet; guide piers and mooring posts provided; suitable for unloading bulk materials; leased to private industries.

Ontario Paper Company Wharf No. 2 is located on the east side of the canal, immediately south of the guard gate and adjacent to Provincial Highway 58. This wharf was built and equipped by the paper company: usable length, 485 feet; depth alongside, 26 feet; operated for loading newsprint and for unloading pulpwood and coal.

Beaver Board Wharf is located on the east side of the canal one-half mile south of the guard gate and one-half mile from Provincial Highway 58; usable length 1,000 feet; depth alongside, 26 feet. The south half is leased, but arrangements may be made with the lessee for use by other companies. On the north half a strip 20 feet wide adjoining the wharf is available for public use, the balance is leased.

Just north of Bridge 11 a second channel leads northwesterly from the main channel. This is the Old Third Canal channel now used to divert water from Lake Erie into the Lake Gibson storage reservoir for the Ontario Hydro Electric Power Commission's DeCew Falls power development.

Port Robinson

A turning basin for vessels up to 600 feet in length is located immediately south of Bridge 12. No wharfage is as yet provided in this area.

Welland

The Welland Centre Wharf is located on the east side, immediately south of Bridge 14; $\frac{1}{4}$ mile from Provincial Highway 58; usable length 1,100 feet; depth alongside, 13 feet; leased to various building supply and coal companies; small area available for public use.

The Welland South Wharf is located on the east side immediately south of Bridge 16; adjacent to Provincial Highway 58; rail connection to Canadian Pacific Railway and Canadian National Railways; usable length, 626 feet; depth alongside 26 feet. Tracks are at present leased to two local industries, but are available to others by arrangement.

Port Colborne

A turning basin for vessels not exceeding 450 feet in length is provided immediately north of Lock 8 on which the following wharves are located:—

East Side.—Rameys Bend Wharf, adjacent to Provincial Highway 58; rail connections with Canadian Pacific Railway and Canadian National Railways; usable length, 1,800 feet; depth alongside, 27·5 feet; north half leased to a coal company; bunkerage available; south half leased to a flour milling company.

West Side.—West Docking; usable length, 1,800 feet; depth alongside, 27 feet; southerly 1,000 feet leased to a milling company; northern 800 feet undeveloped, but connections to highways, Canadian Pacific and Canadian National Railways may readily be made available.

The Canal Administration Building is situated on the west bank abreast of Lock 8.

Port Colborne Marine Post Office is in the Administration Building at Lock 8. Postage stamps, money orders and regular and registered letter post are available 24 hours a day during the season of navigation.

Port Colborne Harbour

The location of this harbour at the Lake Erie entrance to the canal is shown on Canadian Hydrographic Service Chart No. 2174. It is situated about 18 miles west of Buffalo, N.Y.

The channel has been constructed for 27-foot navigation from the lake inwards, with Lake Erie at elevation 570. There are about three and three-quarter miles of wharf wall available for winter mooring, three and one-quarter miles of which have not less than 27 feet depth and the remaining 1,800 feet, 14 feet depth.

The harbour is protected by two breakwaters. The western one is about 4,300 feet long, located about 4,000 feet off shore and running in a westerly direction from the entrance towards Sugarloaf Point. It is built of timber cribwork covered with concrete, riprapped with large stones along the south or lake face, and at its eastern end there is a timber cribwork pierhead 100 feet by 60 feet, on which is the inner light of the harbour. From the above main breakwater, at a point about 1,000 feet west of its eastern end, a spur breakwater extends lakeward, a little east of south, about 2,100 feet. It is built of concrete cribs and mass concrete superstructure, with rock riprap on its southwesterly face, terminating with a concrete crib pierhead 100 feet square, on which is the outer light of the harbour. This spur breakwater protects the harbour from southwest gales.

The eastern breakwater begins with a lighted pierhead located 625 feet east of the main western breakwater pierhead and extends thence a little north of east 2,460 feet. It is built of timber cribwork substructure and concrete superstructure, with rock riprap along its outer face and western end. This structure should be given a clearance of 150 feet by mariners.

An anchorage area of about 37 acres lies inside the inner light of the west breakwater and west of the ship channel. It is provided with two harbour piers, 600 feet long and 200 feet wide, projecting from the northerly or shoreward side. On the westerly pier is located the Government Elevator and on the easterly one a privately owned elevator and mill. This area has a least depth of 18 feet except along the westerly side of the latter pier where the least depth is 16 feet. The slip west of the Government Elevator pier, and a channel about 270 feet in width leading thereto, have a least depth of 19 feet.

The harbour entrance channel passes east of the lights on the pierheads of the spur and main west breakwaters, and is 500 feet wide and 29 feet deep. From the pierhead of the main western breakwater, the west limit of the canal channel follows a straight line to an angle in the west wall, 300 feet north of the easterly harbour pier. This channel is 28 feet deep and gradually reduces in width from 500 to 400 feet.

Approximately 500 feet southerly from a rectangular pier (200 feet by 35 feet), which is located about 300 feet east from the main channel centre line, will be found an octagonal timber crib which marks the easterly edge of the channel. The above rectangular pier and a similar one located about 300 feet in a northerly direction, should be given a clearance of 100 feet in passing. The east wall of the harbour and of the canal channel begins at a point 1,600 feet north of the two harbour piers and 6,000 feet north of the outer light, and extends continuously to Lock 8, a distance of nearly 6,000 feet. Just south of the outer end of the east wall, the canal channel deflects a little to the west and continues parallel to the east wall, its width reducing from 275 feet to 220 feet on approaching the first bridge, No. 21, which is 1·7 miles north of the outer light. The second bridge, No. 20, crosses 300 feet north of the first bridge, and 700 feet north again the canal curves a little to the east and continues so for about 1,400 feet. The canal channel varies in width from 220 feet to 200 feet. The canal channel of the harbour has a minimum depth of 27 feet.

The west wall of the harbour is continuous from the south end to the old guard locks, a distance of about 5,200 feet. For 2,000 feet north of the north end of the mill pier this wall is along the canal channel which is 28 feet deep.

Upon the rock fill to the west of the wall are laid tracks of the Canadian National Railways to the Government Elevator, mill piers, coaling stations, and to an oil station. From the north end of this section to the old guard locks the depth is only 15 feet in the channel between the west wall and the deep canal channel.

Just north of the second bridge, No. 20, and the old guard locks, there is an opening of 1,000 feet in the bank between the old and new canals, with a depth of 17 feet. This gap was the entrance to the Old Canal, but is now the entrance to the supply channel of the Ship Canal. North of the gap is located the upper west entrance wall, 2,000 feet long, of the new guard lock.

Along the east wall of the canal channel are located the yards of the Canadian National Railways, of two metallurgical companies, and of a coaling station.

Lights.—Outer light, fixed red, on the pierhead of the west spur breakwater, shows a strong beam over an arc of 30° covering the approach from the turning buoy, with a secondary light visible from the harbour side. There is also an electric fog horn. Its cycle is: blast 2 seconds, silence 28 seconds. The easterly edge of the channel opposite the outer light is marked by a lighted buoy painted black showing a flashing white light. Inner light, on the pierhead at the east end of the main west breakwater, shows one white flash every 5 seconds, visible 14 miles; an electric fog bell rings continuously in thick weather and a radio-beacon is in operation. East breakwater light, on the east pierhead, is flashing green, visible 12 miles.

A vertically striped black and white light and bell buoy, showing a flashing white light, is moored in Lake Erie at a point 3·4 miles SSW.$\frac{1}{2}$W. from the inner light on west breakwater.

Wharfage Areas.—On the Welland Ship Canal wharfage areas are shown on Canadian Hydrographic Service Chart No. 2042.

Scenic and Historical Points of Interest

At Homer, between Locks 2 and 3, the canal is spanned by a double bascule bridge carrying the Queen Elizabeth Way, a modern four-lane highway.

Locks 4, 5, and 6, twin locks in flight, are similar to those of the Panama Canal at Gatun, but have a much greater individual and aggregate lift though they are both narrower and shorter and have less draught. At the foot of the flight on the west bank is located the canal power house, generating electric power to light and operate the whole canal.

It was at the north end of the centre wall of Twin Lock 6, that the official ceremony for the opening of the Ship Canal was held on August 6, 1932. The Governor General, the Earl of Bessborough, officiated in the presence of many members of the British Empire Economic Conference representing all the countries of the Commonwealth.

The chain of ponds northeast of these twin locks, by means of which the canal water supply descends to the level below, follows the locks and ponds of the old Third Welland Canal.

On the east bank of the portion of the Old Third Canal channel which remains, east of the Ship Canal just south of Bridge 8, stands a cairn commemorating the battle of Beaverdams, June 23, 1813.

At the western end of Bridge 11, at Allanburg, there is another cairn commemorative of the turning of the first sod for the First Welland Canal, November 30, 1824.

Previous Welland Canals

The first three Welland Canals had their northern terminus at Port Dalhousie, about three miles west of Port Weller. That port is still in operation together with Lock 1 of the Third Canal, by means of which vessels may enter the reach which has been common to the Second and Third Canals.

Port Dalhousie.—This harbour is shown on Canadian Hydrographic Service Chart No. 2070.

The entrance is located between two substantial and well-lighted piers 200 feet apart, with ample water for all vessels of 14-foot draught. A fixed red light, visible 9 miles, and an air fog tyfon whose cycle is: blast 4 seconds, silence 26 seconds, are located on the outer end of the east pier. The main light, fixed red, visible 15 miles, is located on shore near the end of the east pier, 1,500 feet 177° (S.$\frac{1}{4}$E.) from the outer light.

Second Welland Canal.—Except for the reach above Lock 1, this canal is no longer used for navigation but its course is utilized as a drainage channel for adjoining municipalities and as a tail-race channel for the DeCew Falls Power Development of the Hydro-Electric Power Commission of Ontario.

Third Welland Canal.—Only Lock 1 of this canal is now in operation. A large portion of its channel was incorporated in the Ship Canal.

From the Lake Erie entrance of the Welland Ship Canal to the foot of the Sault Ste. Marie Canal the distance is 575 miles.

Welland Ship Canal—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks				
		Length Between Hollow Quoins	Usable Length	Minimum Width	Depth on Sill	Lift
	(Lake Ontario—Standard low water, 243·0 above M.S.L.)					
		feet	feet	feet	feet	feet
0·00	Lake Ontario entrance—Port Weller					
1·17	Gate Lifter dock					
1·51	Small Boat dock					
*1·90	Lock 1—Port Weller	865	715	80	30·0 (min.)	46·0 (max.)
2·01	Bridge 1—Lake Shore Road—Single Bascule					
2·08	Entrance to Drydock.					
3·70	Lock 2	859	715	80	30·0	46·5
3·80	Bridge 3—Carleton Street—Single Bascule					
5·15	Turning Basin—Vessels up to 350 feet long					
5·19	St. Catharines Wharf (390 ft. long—22 feet depth)					
5·62	Bridge 4—Queen Elizabeth Way—Double Bascule					
6·35	Lock 3	859	715	80	30·0	46·5
7·05	Bridge 5—Merritton—Vertical Lift					
7·20	Hydro-Electric Power Line					
7·50	Welland Ship Canal power house					
7·58	Bridge 6—Can. Nat. Rys.—2 single Bascules					
7·66	Lock 4—Twin in flight	859	715	80	30·0	47·9
7·83	Lock 5—Twin in flight	859	717	80	30·0	47·9
8·00	Lock 6—Twin in flight	859	717	80	32·8	43·7
8·60	Lock 7—Thorold	859	717	80	30·0	46·5
8·71	Bridge 7—Peter Street—Thorold—Single Bascule					
8·96	Bridge 8—N. St. C. & T. Ry.—Swing, 80′ Channel					
9·05	Thorold Wharf (800 ft. long, 30 ft. depth)					
9·30	Centre of Turning Basin—Vessels up to 800′ long					
9·40	Ontario Paper Company Wharf No. 1 (530 ft. long, 21 ft. depth)					
9·45	Shriners Culvert					
9·55	Bridge 9—Thorold-Allanburg Road—Single Bascule					
9·55	Guard Gate and Safety Weir					
9·75	Ontario Paper Company Wharf No. 2 (485 feet long, 26 ft. depth)					
9·95	Mooring dolphins					

* Mileage for all locks is to centre of structure.

Welland Ship Canal—Mileage and General Data—Conc.

Mileage	Structure, Locality, etc.	Locks				
		Length Between Hollow Quoins	Usable Length	Minimum Width	Depth on Sill	Lift
		feet	feet	feet	feet	feet
10·17	Beaverdams culvert					
10·17	Beaver Board Wharf (1000 ft. long, 26 ft. depth)					
10·45	Bridge 10—Can. Nat. Rys.—Vertical lift					
10·55	Hydro-Electric power line					
11·33	Davis culvert					
11·51	Third Canal channel to H.E.P.C. Weir 1					
11·94	Bridge 11—Highway 3-A, Allanburg Vertical Lift					
12·11	Hydro-Electric power line					
13·00	Hydro-Electric power line					
14·52	Bridge 12—Port Robinson—Vertical lift					
14·53	Hydro-Electric submarine cable crossing					
15·10	Centre of Turning Basin—Vessels up to 600 ft.					
18·30	Welland River Aqueduct—Welland					
18·52	Bridge 13—Main Street, Welland—Vertical lift					
18·66	Gas main submarine crossing					
19·07	Hydro-Electric power line					
19·09	Bridge 14—Water Street, Welland—Vertical lift					
19·11	Oil pipe line submarine crossing					
19·25	Welland Centre Wharf (1100 ft. long, 13 ft. depth)					
19·36	Hydro-Electric power line					
19·55	Telegraph submarine cable crossing					
19·56	Bridge 15—Michigan Central Railway—Swing—91·9 and 102·5 ft. draws					
19·75	Gas main submarine crossing					
19·79	Bridge 16—Ontario road—Vertical Lift					
19·95	Welland South Wharf (626 ft. long, 26 ft. depth)					
20·15	Hydro-Electric power line					
21·50	Bridge 17—Can. Nat. Rys.—Vertical lift					
21·60	Hydro-Electric submarine cable crossing					
21·64	Telephone submarine crossing					
21·65	Bridge 18—Forks Road—Vertical lift					
21·66	Gas main submarine crossing					
23·65	Entrance to Rameys Bend—10 ft. depth					
24·30	Rameys Bend wharf (1800 ft. long, 27·5 ft. depth)					
24·30	Centre of Turning Basin—Vessels up to 450 ft.					
24·42	Robin Hood Wharf (1800 ft. long, 27 ft. depth)					
24·42	Tailrace from Supply Weir					
24·85	Bridge 19—Highway 3, Port Colborne—Single Bascule					
25·02	Lock 8—Guard Lock, Port Colborne.....	1,380	1,148	80	30·0	2·0 to 11·0
25·65	Third Canal Wharf, Port Colborne (1100 ft. long, 15 ft. depth)					
25·85	Bridge 20—Can. Nat. Rys.—vertical lift					
25·91	Bridge 21—Clarence Street—Port Colborne vertical lift					
26·20	Centre of West Street Wharf (1800 ft. long, 14 ft. depth)					
26·23	Centre of East Harbour Wharf (2650 ft. long, 28 ft. depth)					
27·40	Centre of West Harbour Wharf (2000 ft. long, 28 ft. depth, and 900 ft. long, 20 ft. depth)					
27·60	Lake entrance—Port Colborne					
	Total lift.....	.....	.....	.....	.....	327·0
	(Lake Erie—Standard low water, 570·0 feet above M.S.L.) (Permissible Maximum draught in Canal 23·5 feet)					

SAULT STE. MARIE CANAL

The first canal was constructed between 1797 and 1798 by the Northwest Fur Company. It had one wooden lock 38 feet by 9 feet with 1 foot 6 inches depth on the sill. It was partially destroyed by the United States Troops in 1814.

Between the years 1887 and 1895 a second canal was built. Its length is 1·38 miles and comprises one lock 900 feet by 60 feet with 18·25 feet of water on the sill. The total rise at mean stage is 19 feet.

Length of canal, between extreme ends of entrance piers	1·38 statute miles or 7,295 feet
Number of locks	1
Dimensions of lock	900 feet by 60 feet at low water level; width at lock bottom, 59 feet.
Normal draught	18 feet 3 inches*
Total rise of lockage (mean)	19 feet
Breadth of canal at bottom	141 feet 8 inches
Breadth at surface of water	150 feet
Minimum overhead clearance	No restrictions

This canal is constructed through St. Mary's Island on the north side of the rapids of the St. Mary River, and, with this river, furnishes communication between Lakes Huron and Superior. It is the most westerly canal on the Main Route.

The canal is lighted by electricity and its lock is electrically operated.

The canal is crossed by one bridge, the Canadian Pacific Railway swing span, near its western entrance.

On the route from the Welland Canal to Sault Ste. Marie a great deal of dredging has been done both between Lakes Erie and Huron and in the St. Mary River, to increase the natural draught to about 21 feet upbound and 24 feet downbound. Draught in the St. Mary River varies with flow conditions and recommendations as to draught are issued from time to time in co-operation with the Lake Carriers' Association.

At Sault Ste. Marie, although the Canadian Lock has only 18 feet 3 inches of water on its sills at ordinary water level, the newest United States lock on the southern bank, the "McArthur," has 31 feet of water.

The four United States locks together with the Canadian lock handle a far greater volume of shipping than any other canal system in the world.

ATLANTIC OCEAN TO BRAS D'OR LAKES ROUTE

This route, which crosses an isthmus about half a mile in width, connects St. Peters Bay on the southerly side of Cape Breton Island, Nova Scotia, with the Bras d'Or Lakes, the northerly end of which is open to the Atlantic Ocean.

It is used chiefly by vessels to and from Sydney, Nova Scotia, seeking a more protected passage than is afforded by the open sea. It proved particularly valuable during World War II.

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* As heavy easterly gales raise and westerly gales lower, temporarily, the water levels below the lock, it is recommended that masters of larger vessels ascertain the available depth from the canal office prior to locking. During navigation seasons, the depth of water on the lock sills has been as low as 15 feet 8 inches (Nov. 10, 1926).

ST. PETERS CANAL

1854–1869—First canal and lock built to provide 13 feet draught.

1875–1881—Enlarged to 18 feet draught.

1912–1917—Lock enlarged from 200 feet by 48 feet to 300 feet by 48 feet.

Length of canal	About 2,640 feet (0·50 statute miles)
Breadth at water line	55 feet
Lock	1 tidal lock, 4 pairs of gates.
Dimensions of lock	300 feet by 47 feet $4\frac{7}{8}$ inches
Normal draught	17 feet
Depth of water on sills	18 feet at lowest water
Extreme rise and fall of tide in St. Peters Bay	7 feet
Minimum overhead clearance	140 feet (transmission line)

The canal is crossed by one bridge, a highway swing span, near the northern entrance.

The canal is lighted by electricity.

RICHELIEU RIVER AND LAKE CHAMPLAIN ROUTE

This is the short route for water-borne traffic between Montreal and New York. It is limited by the size of the Chambly Canal locks to vessels not longer than 112 feet or wider than 22 feet 6 inches, with a draught not greater than 6 feet, 6 inches.

Vessels leaving Montreal proceed down the River St. Lawrence to Sorel at the mouth of the Richelieu River and up this river 14 miles to the lock at St-Ours. The river at this point is divided by a small island into two channels. The St-Ours Canal is in the eastern channel and the western channel is closed by a dam 635 feet long. This dam raises the river level sufficiently to provide a navigable channel 7 feet deep upstream to the foot of the Chambly Canal on the southern shore of Chambly Basin which is 32 miles distant. Here still stand the well preserved walls and some of the buildings of Fort Chambly built when the Richelieu River was the war path of the Iroquois and of Champlain and his successors.

The Chambly Canal, built near or on the bank of the river, overcomes the long series of rapids which extend from Chambly Basin to St. Johns. From St. Johns to Lake Champlain navigation is still restricted to about five feet during low water periods by some shallow places in the river. However, the lake has deep water across the International Boundary to Whitehall, the northern terminus of the Champlain Canal, which furnishes a 12-foot draught connection with the Hudson River at Troy, the eastern terminus of the Erie Canal. From Troy there is deep water navigation to New York City and harbour.

The first use of the Richelieu River by white men was an expedition led by Champlain in 1609. "The Flotilla of twenty-four canoes carrying sixty men including twelve Frenchmen proceeded up the river for forty-six miles." On July 14, 1609, they reached a lake, now Lake Champlain.

In 1666, transportation between Sorel and Chambly was made by large scows (barques), barges, and canoes. At St-Ours and at Chambly the cargoes were carried overland through dense forests to Fort Ste-Thérèse, five miles above Fort Chambly. The "portage" roads were built by the French Military Authorities.

In 1747, the French Military Authorities removed the chain of rocks across the river at St-Ours. This was the first dredging work performed in Canada. In 1758 boats carrying 150 quintals and handled by four men covered the distance from Sorel to Chambly in two days. Carts carrying 6 quintals each, conveyed the cargoes across the portage to Fort St. Johns.

In 1778, Silas Deane, a native of Connecticut, proposed the construction of a canal to General Haldimand, and in 1787 to Lord Dorchester, but it wasn't until 1792 that Schuyler's Company was incorporated for the construction of the Champlain Canal to connect the Hudson River and Lake Champlain.

This construction stimulated efforts in Lower Canada and on April 1, 1818, the Parliament of Lower Canada incorporated the Company of Proprietors of the Chambly Canal and passed "an Act for making and maintaining a navigable canal, from, at or near the Town of St. Johns, upon the River Sorel or Richelieu, through the Barony of Longueuil and the Seigneurie of Chambly, to terminate at the Basin of Chambly". The locks were to be 20 feet in breadth and to admit vessels drawing five feet of water. Commissioners were appointed to supervise the work. Surveys were made but construction did not start until 1833. In 1835 the work was entirely suspended. Numerous delays occurred and it wasn't until after the Union of Upper and Lower Canada that the Board of Works completed the Canal on the 17th of November 1843.

The same Board of Works completed the construction of a lock and dam at St. Ours in September 1849. The lock, 200 feet long by 45 feet wide, was of cut stone and provided a depth of 6½ feet. In 1932, a new lock, 339 feet by 45 feet, with a depth of 12 feet on the sills, was completed.

Details concerning the two Canadian canals along this route are as follows:

ST-OURS CANAL

Length	0·12 statute miles
Number of locks	1
Dimensions of lock	339 feet by 45 feet
Normal draught	12 feet*
Total rise of lockage	5 feet
Minimum overhead clearance	No restrictions

The lock is operated and lighted by electricity.

CHAMBLY CANAL

Length of canal	11·78 statute miles
Number of locks	9
Dimensions of locks:—	
Lift Locks 1 to 8	(Width, from 23 ft. 3 in. to 24 ft. 4 in. Length, from 120 ft. 6 in. to 126 ft.)
Guard Lock 9 at St. Johns	120 ft. 7 in. by 23 ft. 7 in.
Total rise of lockage	80 feet
Normal draught	6 feet 6 inches†
Breadth of canal at bottom	36 feet
Breadth of canal at water surface	60 feet
Minimum overhead clearance	120 feet (Telephone Wires)

The canal overcomes the rapids between Chambly and St. Johns.

The locks are hand-operated and the canal is lighted by electricity.

From St. Johns to the International Boundary the distance is 22 miles.

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* The draught available at this lock varies with the stage of the Richelieu River. During navigation seasons the lowest depth of water on the lock sills has been 11·20 feet on the upper sill (Oct. 13, 1934). The highest levels recorded were on April 21, 1896—33·46 on the lower sill and 27·79 on the upper.

† The draught available at the terminal locks of this canal varies with the stage of the Richelieu River. During navigation seasons the lowest depth of water on Lock 1 lower sill has been 6·40 feet (Oct. 15, 1934) and on Lock 9 upper sill 6·00 feet (Oct. 19, 1908). The highest level recorded at Lock 1 has been 26·50 feet (Mar. 20, 1936) and at Lock 9, 13·83 feet (April 17, 1922).

Chambly Canal—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught	Lift
		ft. in.	ft. in.	ft. in.	feet
0·00	Entrance—Chambly Basin (outer end of guide pier)				
0·12	Lock 1	125 10	23 5	6 6*	15·50
0·14	Lock 2	125 11	23 6	6 6	9·70
0·17	Lock 3	126 0	23 8	6 6	9·80
0·18	Bridge 1—Swing—Highway				
0·72	Lock 4	120 6	23 4	6 6	7·20
0·84	Lock 5	120 8	24 4	6 6	8·00
0·93	Lock 6	120 9	23 4	6 6	8·20
1·08	Bridge 2—Swing—Highway				
1·26	Lock 7	120 9	23 4	6 6	7·40
1·51	C.N.R. bridge—Chambly Canton—Swing				
1·60	Lock 8	126 0	23 3	6 6	9·00
1·61	Bridge 3 (Mark's)—Rolling				
2·13	Bridge 4—Swing—Farm road				
2·76	Bridge 5—Swing— " "				
3·26	Bridge 6—Swing— " "				
3·75	Bridge 7—Swing—Highway				
4·90	Bridge 8—Swing—Farm road				
5·57	Bridge 9—Swing— " "				
8·32	Bridge 10—Ile Ste. Thérèse—Swing—Highway				
10·21	Siphon culvert				
11·13	Lock 9	120 7	23 7	6 6†	5·20
11·23	C.P.R. bridge at St. Johns—Swing				
11·51	Bridge 12 (Gouin) at St. Johns—Bascule—Highway				
11·70	Entrance—Richelieu river (end of guide pier)				
11·76	C.N.R. bridge—Swing				
11·78	Upper end of wharf				
	Total lift				80·00

MONTREAL, OTTAWA AND KINGSTON ROUTE

This route was projected soon after the close of the War of 1812 in order to provide for the young colony an alternate, safer line of communication between Montreal and the new settlements on the Great Lakes, to be available in the event of any resumption of war with the United States.

Happily, that purpose soon became obsolete. Instead, the route was of considerable commercial usefulness for many years, but with highway competition on a motorized basis this use also waned.

However, the whole route, particularly the Ottawa-Kingston section, has grown in importance from tourist and recreational viewpoints.

Starting from Montreal, this waterway follows the Main Route through the Lachine Canal and leaves it in Lake St. Louis, branching off in the middle of the lake to Ste. Anne de Bellevue at the western tip of the Island of Montreal. In order to surmount the short Ste. Anne Rapids there, where one branch of the Ottawa enters Lake St. Louis, vessels must pass through the Ste. Anne Canal into the Lake of Two Mountains.

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* The lowest depth of water recorded for this sill is 6 ft. 5 in., 1934; the highest 26 ft. 6 in., 1934.

† The lowest depth of water recorded for this sill is 6 ft. 0 in., 1908; the highest 13 ft. 10 in., 1922.

At the head of this lake are the Carillon Rapids overcome by the Carillon Canal along the northern shore. Here, in or near the village of Carillon, is the spot where, in 1660, Dollard Des Ormeaux and his 16 companions built their rude log fort and perished to a man in their heroic and successful attempt to turn back some 700 Iroquois bent on attacking the young settlement at Montreal.

Located at the head of the rapids, the Carillon Dam raises the water level of the river, thus making it navigable to the foot of the Long Sault Rapids, six and a quarter miles farther upstream.

These rapids are overcome by the Grenville Canal on the northern bank, from the head of which the river is navigable to the foot of the Chaudiere Falls at Ottawa from where the Rideau Canal commences.

The Rideau Canal has made the Rideau and Cataraqui Rivers navigable by means of short cuttings here and there, with dams at suitable points along their courses and accompanying locks to surmount the changes in water elevations. It has utilized the chain of scenic lakes lying at their sources and at the headwaters of the Gananoque River to form one connected waterway from Ottawa to Lake Ontario at Kingston.

More detailed descriptions of the four canals along this route are as follows:

STE. ANNE CANAL

In 1816 the first canal with one wooden lock was built in the western channel at Vaudreuil by the St. Andrews Steam Forwarding Company to provide 5 feet draught.

In the years 1840 to 1843 the first Ste. Anne Canal was built in the eastern channel by the Board of Works to provide 6 feet draught.

The canal was enlarged in the years 1879 to 1886 to provide 9 feet draught.

Length of canal	0·12 statute miles
Number of locks	1
Dimensions of lock	200 feet by 45 feet
Total rise of lockage	3 feet
Normal draught	9 feet*
**Overhead clearance with 9 feet of water on lower sill	41 feet 5 inches

This canal, 22¼ miles from Montreal Harbour, overcomes the Ste. Anne Rapids between Ile Perrot and the head of the Island of Montreal, at one of the outlets of that expansion of the Ottawa River: Lake of Two Mountains. The lock is operated and lighted by electricity.

From the Ste. Anne Canal to the foot of the Carillon Canal, there is a navigable stretch of 27 miles through the Lake of Two Mountains and the Ottawa River.

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* The draught available at this lock varies with the stage of the Ottawa River and Lake St. Louis. During navigation seasons the lowest depth of water on the lock sills has been 7·85 feet on the lower sill (Sept. 11, 1934). The highest levels recorded have been 17·32 feet on the lower sill (May 14, 1943) and 20·00 feet on the upper sill (May 29, 1909).

** This clearance (C.N.R. Bridge) varies with the level of Lake St. Louis. The minimum recorded has been 33 feet, 1 inch; the maximum 42 feet, 7 inches.

CARILLON CANAL

The first canal was built between the years 1825–1833 by the Royal Engineers to provide 6 feet draught.

The Canal was enlarged to 9 feet draught between the years 1873 and 1882.

Length of Canal	0·94 statute miles
Number of locks	2
Dimensions of locks	200 feet by 45 feet
Total rise of lockage	14 feet
Normal draught	9 feet
Breadth of canal at bottom	100 feet
Breadth of canal at water surface	110 feet
Minimum overhead clearance	45 feet (Transmission Line)

The locks are hand-operated and the canal is lighted by electricity.

The Carillon Dam, built across the Ottawa River, raised the water level at that point by 9 feet, thus making the river above it navigable to the foot of the Grenville Canal, a distance of 6·25 miles.

GRENVILLE CANAL

The first canal was built by the Royal Engineers in the years 1825 to 1829 to provide 6 feet draught.

The canal was enlarged to 9 feet draught in the years 1871–1882.

Length of canal	5·94 statute miles
Number of locks	5
Dimensions of locks	200 feet by 45 feet
Total rise of lockage	43 feet
Normal draught	9 feet
Breadth of canal at bottom	45 to 50 feet
Breadth of canal at water surface	50 to 80 feet
Minimum overhead clearance	42 feet (C.N.R. Bridge)

The locks are hand-operated and the canal is lighted by electricity.

From the Grenville Canal, the Ottawa River affords unimpeded navigation to the foot of the Rideau Canal at Ottawa, 56 miles distant.

Carillon and Grenville Canals—Mileage and General Data

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught	Lift
		ft. in.	ft. in.	ft. in.	feet
	CARILLON CANAL				
0·00	Lower entrance to Carillon Canal				
0·09	Lock 1	202 3	45 0	9 0*	10·50
0·76	Lock 2	200 9	45 0	9 0	3·50
0·94	Upper entrance to Carillon Canal				
	Total lift				14·00

* See footnote on page 33.

Carillon and Grenville Canals—Mileage and General Data—Con.

Between the upper entrance to the Carillon Canal and the lower entrance to the Grenville Canal there is a distance of about 6¼ miles.

Mileage	Structure, Locality, etc.	Locks			
		Length between hollow quoins	Minimum Width	Normal Draught	Lift
	GRENVILLE CANAL				
0·00	Lower entrance to Grenville Canal				
0·11	Lock 3	199 9	45 0	9 0*	13·20
0·27	Waste weir				
0·38	Lock 4	200 3	45 0	9 0	16·70
0·53	Waste weir				
1·27	Lock 5	200 0	45 0	9 0	6·60
1·27	Bridge 1—Stonefield—Swing				
1·64	Waste weir				
4·20	Lock 6	200 6	45 0	9 0	4·00
4·58	C.N.R. High-level bridge				
4·92	Highway high-level bridge				
5·58	Bridge 2—Bay Street, Grenville—Swing				
5·61	Lock 7	200 3	45 0	9 0*	2·50
5·94	Upper entrance to Grenville Canal				
	Total lift				43·00

RIDEAU CANAL

The Rideau Canal was built by the Royal Engineers in the years 1826–1832 to provide 5 feet draught.

The Tay Branch was built in the years 1831–1834 by a private company to provide 4 feet draught.

The Tay Branch was enlarged in the years 1883 to 1889 by the Dominion Government to provide 5 feet draught.

The Rideau Canal commences in a narrow natural valley flanking the Parliament Buildings at Ottawa, where eight locks in flight rise from the Ottawa River. Then, through the heart of the city, between walls flanked by boulevarded driveways, the canal winds to the artificial expanse called Dows Lake and along the foot of the Dominion Experimental Farm to Hartwell's Locks. Thence it continues above the west bank of the Rideau River to the Hogsback Locks where it enters the river just above the Prince of Wales Falls.

The river is then followed upward to its source in the Rideau Lakes. In its whole course there are only a few short cuttings at various points in addition to those which connect the main channel with the lock entrances.

The south branch of the Rideau River which joins the main river about 30 miles from Ottawa is navigable, without locks, up to the village of Kemptville.

* The draughts available at all entrance locks on the Carillon and Grenville Canals depend on the levels of the Ottawa River. During navigation seasons the lowest and highest depths recorded have been as follows:—

	Lowest	Highest
Lower Lock 1	10·00	22·90
Upper Lock 2	8·17	23·25
Lower Lock 3	10·42	29·00
Upper Lock 7	8·58	24·92

Vessels pass from the Rideau River at Poonamalie Lock into Lower or Big Rideau Lake, the first and largest of a long chain known collectively as the Rideau Lakes, famed for their scenery and holiday possibilities.

Branching off from the main route through these lakes are a number of subsidiary channels. The principal one of these is the six and three-quarter mile Tay Branch Canal which, from near the northern end of Lower Rideau Lake, rises by two locks and through a short cutting into the raised waters of the Tay River which it follows into the Town of Perth.

The other branches utilize principally the open lake waters to reach docks and wharves, most of which are owned privately, at many points along the shores of the various lakes.

Returning to the main course of the canal, the Lower and Upper Rideau Lakes are connected by a lock at the Narrows. The latter lake forms the summit of the route, about 277 feet above the Ottawa River.

A short cutting then leads across the height of land into Newboro Lake, whence the canal descends successively into Opinicon, Sand, Whitefish, and Cranberry Lakes. The latter two have really been a single lake ever since the construction of the canal drowned out the marsh which formerly lay between them.

The outlet from Cranberry Lake is through the Cataraqui River, dammed like the Rideau to make it navigable. Through two successive expanses of drowned land behind these dams the channel runs to Kingston Mills, where by a single lock and three locks in flight, it drops into the natural channel of the Cataraqui and follows it for about six miles to the harbour of the City of Kingston, about 162 feet below the summit level.

The Department of Transport maintains storage reservoirs on Bobs Lake at the head of the Tay River and Wolfe Lake at the head of Upper Rideau Lake, to assist in providing the necessary water supply. In addition, private companies store water on Devils, Hart, Rock, and Loughborough Lakes, the storage and release of which for power purposes benefits navigation interests as well.

With these reservoirs, therefore, it is usually possible to maintain the normal draught, although in periods of low precipitation the draught in some sections is reduced for part of the season.

Vessels passing through the Rideau Canal are limited to 110 feet in length and 30 feet beam. The official draught for vessels is 5 feet but vessels drawing up to 5′6″ may normally pass all sections of the canal except during dry seasons when the draught in some sections is curtailed.

Owing to the rounded, inverted arch floors of certain locks, barges, scows, and other craft with square, flat bottoms, are limited to a draught of 4 feet unless they are somewhat narrower than 30 feet.

The following is a summary of mileage and other data relating to this canal:—

Navigation Distances—	Miles
Ottawa River to summit level at Newboro	84·27
Newboro to Lasalle Causeway, Kingston	39·26
	123·53
South Rideau Branch to Kemptville	2·90
Tay Branch, Big Rideau Lake to Perth	6·82
Portland Branch on Big Rideau Lake	6·48
Westport Branch on Upper Rideau Lake	5·25
Morton Branch on Whitefish Lake	1·62
Seelys Bay Branch on Cranberry Lake	0·65
	147·25

Total Lift and Number of Locks at Normal Navigation levels—	Number of locks	Total lift in Feet
Ascending from Ottawa to summit level (Upper Rideau)	33	277
Descending from summit level to Kingston	14	162
	47	439
Tay Branch ascending to Perth	2	25
	49	464

Dimensions of all locks..... 134 feet by 33 feet.
Draught..... Normal, 5′6″; Minimum, 5′0″

Breadth of Canal Reaches:

Main Channel,	bottom	60′
	top	80′
Tay Branch,	bottom (in rock)	40′
	" (in clay)	60′
	top	80′

Minimum overhead clearance:

Ottawa section only	26′0″
Ottawa to Becketts	27′0″
Becketts to Newboro	27′5″
Newboro to Kingston	30′0″

Normal length of Navigation Season:

Locks put into operation May 1. On week days throughout the month of May, the Canal is in full operation from 8.00 a.m. to 5.00 p.m., but closed on Sundays.

From June 1 to mid-September, operation is from 8.00 a.m. to 11.00 p.m. week days and 9.00 a.m. to 9.00 p.m. Sundays.

From mid-September to the Close of Navigation, usually about November 20, week day operation (closed Sundays) is from 8.00 a.m. to 5.00 p.m.

Operating hours of all Stations are subject to variation from year to year.

Before the commencement of Navigation each year, a "Notice to Mariners" is issued, giving the exact hours for that year.

Rideau Canal—Mileage and General Data

Miles from Ottawa	Structure, Locality, etc.	Locks				Overhead Clearance	Canal Prism
		Length between hollow quoins	Minimum Width	Normal Draught	Average Lift		
		ft. in.	ft. in.	ft. in.	feet	ft. in.	miles
	(Ottawa River—mean level 131·0 above M.S.L.; low in 1921—127·8; high in 1928—148·7)						
0·00	Ottawa River, Ottawa						
0·00	Ottawa Locks, 1 to 8, in flight	134 0	33 0	5 6	79·00	.....	.....
0·22	Plaza concrete arch and steel bridge	.....	.....	.....	.....	26 6	.....
0·40	Mackenzie King concrete fixed span bridge	.....	.....	.....	.....	26 0	.....
0·54	Laurier Avenue steel arch bridge	.....	.....	.....	.....	27 3	.....
1·50	Isabella Street C.N.R. swing bridge						
1·56	Bridge 1—Vertical lift—Pretoria Avenue	.....	.....	.....	.....	28 6	.....
2·81	Bank Street concrete arch bridge	.....	.....	.....	.....	27 0	.....
3·40	Bridge 2—swing—Bronson Avenue						
3·72	Bridge 3—swing—C.P.R.						
4·17	Hartwell Locks, 9 and 10, in flight	134 0	33 0	5 6	21·50	.....	4·17
5·23	Hogsback Locks, 11 and 12, in flight	134 0	33 0	5 6	14·50	.....	1·05
5·25	Bridge 4—swing—Hogsback; canal enters Rideau River						
7·43	C.N.R. high level bridge	.....	.....	.....	.....	31 0	.....
9·25	Lock 13—Black Rapids	134 0	33 0	5 6	9·16	.....	.....
14·25	Long Island Locks, 14 to 16, in flight	134 0	33 0	5 6	25·33	.....	0·13
14·33	Bridge 5—swing—Long Island, over Lock 16	.....	.....	.....	.....	.....	0·13
16·03	Bridge 6—swing—Manotick						
23·33	Bridge 7—swing—Kars						
30·48	Channel to Kemptville	South Rideau Branch to Kemptville					
33·38	Kemptville Wharf						
31·93	Becketts high level fixed bridge	.....	.....	.....	.....	27 0	.....
38·93	Lock 17—Burritts Rapids	134 0	33 0	5 6	9·00	.....	.....
39·43	Bridge—swing—Burritts Rapids	.....	.....	.....	.....	.....	1·50
41·83	Flight Lock 18—Nicholsons	134 0	33 0	5 6	6·50	.....	.....
42·09	Flight Lock 19—Nicholsons	134 0	33 0	5 6	8·00	.....	0·57
42·10	Bridge 10—swing—Nicholsons—over lock 19						
42·50	Lock 20—Clowes	134 0	33 0	5 6	7·58	.....	0·07
44·30	Merrickville C.P.R. high level bridge	.....	.....	.....	.....	40 0	.....
44·65	Flight Lock 21—Merrickville	134 0	33 0	5 6	8·66	.....	.....
	Flight Lock 22—Merrickville	134 0	33 0	5 6	10·00	.....	0·53
	Flight Lock 23—Merrickville	134 0	33 0	5 6	6·00	.....	.....
44·81	Bridge 11—swing—Merrickville—over lock 23						
52·81	Lock 24—Kilmarnock	134 0	33 0	5 6	2·00	.....	0·25
52·82	Bridge 13—swing—Kilmarnock, over Lock 24						
56·22	Lock 25—Edmonds	134 0	33 0	5 6	9·16	.....	0·15
57·72	C.P.R. high level bridge—Smiths Falls	.....	.....	.....	.....	30 0	.....
57·72	Old Slys Locks, 26 and 27, in flight	134 0	33 0	5 6	16·00	.....	0·23
57·77	Bridge 15—swing—Old Slys						
58·52	Smiths Falls combined locks, 28 29 and 30, in flight	134 0	33 0	5 6	26·00	.....	0·11
58·58	Bridge 17—swing—Beckwith Street						
58·86	Bridge 19—swing—Abbott Street						
58·88	Smiths Falls detached Lock 31	134 0	33 0	5 6	8·50	.....	0·19
58·98	C.N.R. bascule bridge						
60·98	Lock 32—Poonamalie	134 0	33 0	5 6	5·75	.....	1·06
61·58	Entrance to Lower Rideau Lake						
65·10	Diversion to Tay Branch	Tay Canal to Perth					
65·80	Canal entrance — Beveridge Bay — Rideau Lake						
66·00	Lock 33—Beveridges	134 0	33 0	5 6	12·00	.....	.....
66·09	Bridge 21—swing—Beveridges	.....	.....	.....	.....	.....	3·50
66·32	Lock 34—Beveridges	134 0	33 0	5 6	13·00	.....	.....
71·52	Bridge 22—swing—Craig Street, Perth	Non-operating			.....	5 4	.....
71·77	Bridge 23—swing—Beckwith Street, Perth				.....	5 2	.....
71·86	Bridge 24—swing—Drummond Street, Perth				.....	9 6	
71·92	Perth Basin Wharf						
71·96	Bridge 25—swing—Gore Street	(Total length Tay branch 6·12 miles)					

Rideau Canal—Mileage and General Data—Con.

Miles from Ottawa	Structure, Locality, etc.	Locks				Overhead Clearance	Canal Prism
		Length between hollow quoins	Minimum Width	Normal Draught	Average Lift		
		ft. in.	ft. in.	ft. in.	feet	ft. in.	miles
67·02	Bridge 26—swing—Rideau Ferry						
72·42 78·90	Diversion to Portland Portland Wharf	Channel to Portland Wharf on South shore Big Rideau Lake					
80·02 80·02 80·08	Lock 35—The Narrows Bridge 27—swing—The Narrows Entrance to Upper Rideau Lake (Summit level 407·0 above M.S.L.)	134 0	33 0	5 6	3·00	.....	0·04
80·08 85·33	Diversion to Westport Westport Wharf	Channel to Westport Wharf on West shore Upper Rideau Lake					
84·43	Bridge 29—high level, highway	.....	.....	.....	.....	27 6	.....
84·74	Lock 36—Newboro	134 0	33 0	5 6	7·75	.....	1·06
89·74	C.N.R. high level bridge	.....	.....	.....	.....	34 0	.....
90·00	Lock 37—Chaffeys	134 0	33 0	5 6	10·75	.....	0·45
90·00	Bridge 30—swing—Chaffeys						
92·15	Lock 38—Davis	134 0	33 0	5 6	9·00	.....	0·08
96·45	Lock 39—Jones Falls	134 0	33 0	5 6	13·75	.....	.....
96·48	Jones Falls Basin						
96·59	Locks 40 to 42 in flight—Jones Falls	134 0	33 0	5 6	44·75	.....	.....
96·63	Bridge 33—swing—Jones Falls, over Lock 41						
99·38 101·00	Diversion to Morton Morton wharf and dam	Channel to Morton Wharf on Morton River					
100·88 101·53	Diversion to Seelys Bay Seelys Bay wharf	Channel to Seelys Bay Village and Wharf					
103·08	Bridge 36—swing—Brass' Point						
107·28	Locks 43 and 44 in flight—Upper Brewers	134 0	33 0	5 6	18·00	.....	1·45
107·31	Bridge 37—swing—Upper Brewers, over Lock 44						
109·06	Bridge 39—swing—Lower Brewers, over entrance to Lock 45						
109·06	Lock 45—Lower Brewers or Washburn	134 0	33 0	5 6	13·00	.....	4·25
118·81	Lock 46—Kingston Mills	134 0	33 0	5 6	9·83	.....	.....
118·81	Bridge 41—swing—Kingston Mills						
118·83	Kingston Mills basin						
118·91	Locks 47 to 49 in flight—Kingston Mills	134 0	33 0	5 6	35·16	.....	0·25
118·93	C.N.R. high level bridge over Locks 47–48	.....	.....	.....	.....	30 0	.....
123·53	Kingston-Lasalle Causeway bascule bridge						
							17·72
	(Lake Ontario—Mean level, 246·0 above M.S.L.) (Standard low water, 243·0 above M.S.L.)						

LAKE ONTARIO AND GEORGIAN BAY ROUTE

This route is a short-cut for smaller vessels between Lake Ontario and Georgian Bay, an alternative to the longer route by Lake Erie and Detroit. Actually, the Trent Canal by itself is the short-cut, but the Murray Canal, though built primarily to accommodate light-laden lake shipping seeking a more protected channel through the Bay of Quinte, also provides an additional outlet to Lake Ontario for Trent Canal Traffic and is, therefore, geographically included in the route.

MURRAY CANAL

The Canal was built in the years 1882 to 1889, to provide 11.0 feet depth.

Length between eastern and western piers	5·15 statute miles
Breadth at bottom	80 feet
Breadth at water surface, low water, Lake Ontario	124 feet
Draught at elevation 243 of Lake Ontario.	8 feet, 6 inches
Number of locks	None
Minimum overhead clearance	125 feet (transmission line)

This lockless canal extends through the narrow Murray isthmus and connects the western end of the Bay of Quinte with Presqu'ile Bay. Its overall length, including the dredged entrance channels, is 7·53 miles, of which 6·80 miles is on a straight line from the Bay of Quinte entrance to a point in Presqu'ile Bay where the channel swings southward.

Three swing bridges cross the canal; two for highway traffic, and one for the Canadian National Railways.

TRENT CANAL

Three sections of this waterway, not connected, were built in the years 1833 to 1844 for $4\frac{3}{4}$ feet depth; 1—about 16 miles of the middle Trent River, 2—about 52 miles between Heely Falls and Peterborough, 3—an extensive stretch through Chemong, Buckhorn, Pigeon, Sturgeon and Scugog Lakes.

The Province of Ontario built in the years 1869 to 1874 a lock at Rosedale to connect Cameron Lake with Balsam Lake and one at Young's Point to join Stony and Katchiwano Lakes. Each of these locks provided a draught of 6 feet.

Locks were built in the years 1882 to 1887 at Burleigh Falls, Lovesick, Buckhorn and Fenelon Falls for a draught of 6 feet, to complete the connection of all Kawartha Lakes.

Peterborough-Lakefield and Balsam-Simcoe divisions were built in the years 1895 to 1907 for 6 feet draught, making navigation continuous from Heely Falls to Lake Simcoe.

In the years 1906 to 1918 the remaining sections of the canal were built to their present capacities and parts of the oldest sections were rebuilt.

The term "Trent Canal" is applied to that series of rivers and lakes which by a system of dams, locks, short artificial channels, and two marine railways, provides 8-foot navigation for 89 miles from Lake Ontario to Peterborough and 6-foot navigation for an additional 135 miles to Swift Rapids as well as for 8 miles from Georgian Bay to Big Chute. The intervening 8 miles between Swift Rapids and Big Chute are restricted by the capacity of the marine railways at these two locations to a draught of 4 feet. Vessels drawing more than 6 feet must give 12 hours notice before entering the canal between Lake Ontario and the City of Peterborough.

The canal began in a small way in 1833 with the construction of a few locks on the Trent and Otonabee Rivers and on the Kawartha Lakes in order to connect the small pioneer settlements along their banks and shores. In addition to performing this vital service, these early locks and dams, supplemented by an extensive system of log slides, contributed for many years to the flourishing lumber trade of the district. With the depletion of the forests, however, traffic began to settle down to a more prosaic freight-carrying trade. Good roads and motor transport made inroads on this traffic during the nineteen twenties and

thirties, but they have also brought about a very extensive development of the route as a holiday and tourist playground in which the canal facilities play no inconsiderable part.

This route follows in the main the historic Iroquois Trail, the pathway followed by the Iroquois in their deadly descents on the Huron tribesmen. It was the route followed by Champlain when he discovered Lake Ontario while on a retaliatory raid with the Hurons in 1618. It may have been by this same war-path that the Iroquois returned thirty years later to annihilate the Hurons and the flourishing mission of the Jesuits amongst them.

In post-glacial times the Algonquin River followed much the same route. This river was the outlet of Lake Algonquin which then covered lakes Superior, Michigan and Huron and adjacent areas extending south-eastward across Lake Simcoe and Balsam Lake to near Fenelon Falls. From here the Algonquin River followed the Kawartha Lakes to Stony Lake but reached Rice Lake through the Indian River rather than by the Otonabee as at present. Rice Lake was then an arm of a huge lake (called Lake Iroquois by geologists) which in those times covered the present Lake Ontario and a large area of adjacent territory.

From the western end of the Bay of Quinte at Trenton, the canal route follows the Trent River to the eastern end of Rice Lake, rising 367 feet through 18 locks. Midway along the length of Rice Lake the route enters the Otonabee River which it follows upward through Lock 19 into Little Lake at Peterborough. The 8-foot navigation terminates at the lower entrance to Lock 19.

In order to avoid the series of rapids at and above Peterborough, an artificial channel four miles long has been cut through the eastern limits of the city. This waterway connects with the river again at Nassau.

In this section and right on the borders of the city is located the world's highest hydraulic lift lock, No. 21. Two large chambers, 140 feet long and 33 feet wide, are balanced on two huge plungers working in deep presswells in such a manner that when one chamber is up and opening into the upper reach of the canal the other is down and opening into the lower reach. The two chambers are so arranged that the depth of water in the descending chamber is greater than that in the ascending chamber. It is this greater depth and, consequently, greater weight of water in the descending chamber which causes the lock to operate. After the gates at the ends of the chambers and at the ends of the adjoining reaches have been closed, the simple opening of a valve between the two presswells allows the water to flow freely between them, permitting the lighter-laden ascending chamber to be lifted on its plunger by the heavier descending chamber. In this way the lift of sixty-five feet may be accomplished by a vessel in about seven minutes.

Upstream from this section of artificial, excavated channel, comes the long chain of the Kawartha Lakes: Katchiwano, Clear, Stony, Lovesick, Deer Bay, Buckhorn, Chemong, Pigeon, Sturgeon, Cameron and Balsam. These lakes are separated only by very short channels and the rapids or falls through which their surplus water empties into the level below.

These lakes and the islands which dot them adorn an extensive holiday land with scenic attractions rivalling the Thousand Islands of the St. Lawrence River and the Thirty Thousand Islands of Georgian Bay. The Trent Canal has made them accessible to the motor launches and pleasure yachts of tourists. Their tributaries to the north reach out a hundred miles through a hundred smaller lakes equally or even more picturesque.

Balsam Lake is the summit level of the canal. It is 598 feet above low water on Lake Ontario and 260 feet above Georgian Bay.

From near the ruins of "The Fort" of fur-trading days, on the western shore of Balsam Lake, the canal is cut across low land to the nearest point on the Grass River, a tributary of the Talbot River. A dam on the Grass River creates a small artificial lake, called Mitchell Lake. From this lake a cut about three miles long extends to the head of Canal Lake formed by the dammed waters of the Talbot River. In this cut, near Kirkfield, the second hydraulic lift lock on the system, No. 36, is located. Its lift is 49 feet and it differs from the Peterborough Lock in that the towers supporting the lifting chambers are of steel construction while those at Peterborough are of concrete.

The canal follows the Talbot River for about nine miles farther and then to avoid the circuitous river course it follows a straight artificial channel for about three miles to Lake Simcoe.

The waters of Lake Simcoe, and those of its northern extension, Lake Couchiching, are controlled by six dams on the three branches of the Severn River which drain the latter lake at Washago, its northern point. From Washago a two-mile cut leads northerly to the Severn at the foot of Lock 42.

The Severn River flows between picturesque rocky shores and has many deep sections whose raised levels are regulated by the two dams at Swift Rapids and Big Chute. These two dams are not provided with locks but a marine railway at each make it possible for launches of not over 15 tons and 4 feet draught to pass, provided they are no longer than 50 feet nor wider than 13 feet 6 inches. The difference in water level overcome by the Swift Rapids marine railway is 47 feet while at Big Chute, the difference is 58 feet.

Vessels of 6 feet draught and not over 25 feet beam have access also to the reach beyond Big Chute through the lock at Port Severn, the Georgian Bay entrance to the canal.

The draught throughout the canal, except for the marine railway sections, is 6 feet but below lock 19, vessels of 8 feet draught can be accommodated. Under present arrangements, vessels drawing more than 6 feet on this section below Lock 19 are required to give 12 hours notice before entering, as some of its reaches may be drawn down below their standard elevations from time to time for power purposes.

There are a number of branches diverging from the main channel through the lake portion of the canal, but the draught on these is variable. The most important branch is the 35-mile Scugog Branch which extends from Sturgeon Lake up the Scugog River through a lock at Lindsay and across Lake Scugog to Port Perry. This has 6 feet draught up to Lindsay and 4 feet above that point at normal stages of the river.

As all locks from Lake Ontario to Sparrow Lake are 33 feet wide, the beam of vessels navigating this section may not exceed 32 feet 6 inches. Their maximum length, however, depends on their build. Square-built scows are limited to a length of 110 feet but vessels of standard build may be longer. They may be up to 127 feet long if their beam does not exceed 21 feet. Vessels 35 feet longer may be accommodated up to the lower entrance to Lock 19.

The water supply for maintaining water levels in the section of the canal descending towards Georgian Bay is ensured by the control of the Lake Simcoe levels. Water levels in the section descending towards Lake Ontario are maintained by the water stored in the Kawartha Lakes and in sixty-four other reservoir lakes strategically located on the northern tributaries of the Kawarthas in Haliburton and Peterborough counties.

In addition to being a picturesque waterway, the Trent and Severn watersheds cover an area of 7,200 square miles.

Operated from Peterborough, this system constitutes a major flood control area and contributes a considerable amount of power to the Central and Georgian Bay Divisions of the Hydro-Electric Power Commission of Ontario.

Trent Canal—Mileage and General Data

Miles from Trenton	Structure, Locality, etc.	Overhead Clearance		Locks				Canal prism
		Normal	Least recorded	Length between hollow quoins	Minimum width	Normal draught	Average lift	
		ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	Miles
	(Lake Ontario—Mean level, 245·8 above M.S.L.; Standard low water, 243·0 above M.S.L.)							
0·00	Entrance to Bay of Quinte							
0·00	Bridge 1—Dundas St., Trenton—Highway swing							
0·36	Bridge 2—Can. Nat. Rys.—Swing							
0·86	Bridge 3—Can. Pac. Ry.—High level..	43 4	40 1	.....	.....	.....	.....	0·75
1·74	Bridge 4—Can. Nat. Rys.—High level.	30 6	27 3	.....	.....	.....	.....	.....
1·78	Trenton—Lock 1	.....	.....	175 0	33 8	8 0	17 7	.....
2·41	Trenton—Lock 2	.....	.....	175 0	33 0	8 0	20 0	.....
3·67	Bridge 5—Glen Miller—Highway—swing							
3·85	Glen Miller—Lock 3	.....	.....	175 0	33 0	8 0	27 0	.....
								1·00
5·15	Township of Sidney—Lock 4	.....	.....	175 0	33 0	8 0	18 0	.....
6·38	Township of Sidney—Lock 5	.....	.....	175 0	33 0	8 0	18 0	.....
								0·25
7·26	Frankford—Lock 6	.....	.....	175 0	33 0	8 0	16 0	.....
7·56	Bridge 6—Frankford—Highway swing.	.....	.....	.....	.....	.....	.....	1·75
8·01	Emergency dam							
13·82	Glen Ross—Lock 7	.....	.....	175 0	33 0	8 0	10 0	0·50
13·85	Bridge 7—Glen Ross—Highway swing							
13·86	Emergency dam							
13·96	Bridge 8—Can. Nat. Rys.—Swing							
25·26	Township of Seymour—Lock 8	.....	.....	175 0	33 0	8 0	19 7	.....
								1·25
26·41	Township of Seymour..Lock 9	.....	.....	175 0	33 0	8 0	16 0	.....
27·99	Township of Seymour—Lock 10	.....	.....	175 0	33 0	8 0	24 0	.....
								0·75
29·68	Ranney Falls—Locks 11 and 12 in flight	.....	.....	175 0	33 0	8 0	48 0	
29·74	Emergency dam							
29·75	Bridge 11—Highway swing							
30·69	Bridge 12—Can. Nat. Rys.—Bascule...	.....	.....	.....	.....	.....	.....	1·00
30·77	Bridge 13—Can. Nat. Rys.—High level	28 8	27 8	.....	.....	.....	.....	.....
31·13	Bridge 14—Campbellford—Highway bascule							
32·17	Township of Seymour—Lock 13	.....	.....	175 0	33 0	8 0	23 0	.....
								0·50
33·70	Township of Seymour—Lock 14	.....	.....	175 0	33 0	8 0	25 0	.....
33·72	Emergency dam							
36·16	Heely Falls—Lock 15	.....	.....	175 0	33 0	8 0	21 9½	.....
36·18	Bridge 15—Highway swing							
36·51	Heely Falls—Locks 16 and 17 in flight.	.....	.....	175 0	33 0	8 0	54 0	1·00
36·56	Emergency dam							
37·11	Bridge 16—Heely Falls, Highway swing							
43·38	Bridge 17—Trent Bridge, Highway swing							
51·13	Hastings—Lock 18	.....	.....	175 0	33 0	8 0	9 0	.....
51·16	Bridge 18—Highway swing							
51·17	Emergency dam							
51·95	Bridge 19—Can. Nat. Rys.—swing							
57·00	Entrance to Rice Lake							
69·00	Mouth of Otonabee River							
76·53	Bridge 20—Bensfort—Highway swing							
80·35	Bridge 21—Hale's—Highway swing							
88·74	Peterborough—Lock 19	.....	.....	134 0	33 0	6 0	8 0	.....
88·83	Bridge 22—Highway swing							
88·94	Bridge 23—Can. Nat. Rys.—swing							
89·51	Peterborough—Lock 20	.....	.....	142 0	33 0	6 0	12 0	.....
89·61	Bridge 24—Maria St.—Swing							
89·72	Bridge 25—Can. Pac. Ry.—Swing							

For navigation between Lake Ontario and Lock 19, twelve (12) hours notice must be given by vessels of more than 6 ft. draught.

Trent Canal—Mileage and General Data—Con.

Miles from Trenton	Structure, Locality, etc.	Overhead Clearance		Locks				Canal prism
		Normal	Least recorded	Length between hollow quoins	Minimum width	Normal draught	Average lift	
		ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	Miles..
90·10	Peterborough—Lock 21—Hydraulic lift			140 0	33 0	6 0	65 0	
90·58	Bridge 26—Norwood Road—High level	23 8	22 9					
90·58	Guard gate							
91·01	Bridge 27—Warsaw Road—Highway swing							3·50
91·01	Guard gate							
93·25	Guard gate—Nassau							
93·33	Bridge 28—Can. Nat. Rys.—Swing							
93·38	Bridge 29—Nassau—Highway swing							
94·25	Township of Douro—Lock 22			142 0	33 0	6 0	14 0	0·25
94·84	Township of Douro—Lock 23			142 0	33 0	6 0	12 0	
96·38	Township of Douro—Lock 24			142 0	33 0	6 0	12 0	0·25
97·29	Township of Douro—Lock 25			142 0	33 0	6 0	10 0	
98·72	Lakefield—Lock 26			142 0	33 0	6 0	15 8	
99·00	Bridge 30—Lakefield—High level	23 6	20 6					
99·04	Guard Gate—Lakefield							0·50
104·45	Bridge 31—Youngs Point—Highway high level	22 0						
104·47	Youngs Point—Lock 27			175 0	33 0	8 10	7 3	
104·49	Guard Gate—Youngs Point							
112·87	Burleigh Falls—Flight Lock 28			150 0	33 0	6 0	24 0	
	Burleigh Falls—Flight Lock 29			134 0	33 0	6 0		
113·00	Bridge 32—Burleigh Falls—Highway swing							
114·75	Lovesick—Lock 30			134 0	33 0	6 0	3 6	
120·66	Buckhorn—Lock 31			134 0	33 0	6 0	11 6	
120·66	Bridge 33—Buckhorn—Highway swing							0·25
132·68	Bridge 61—Bridgenorth, Chemong Lake Causeway—Highway swing	Branch (Chemong Lake)						
130·17	Bridge 34—Gannon's Narrows—High level	22 0						
138·17	Bridge 35—Bobcaygeon—Swing							
138·21	Bobcaygeon—Lock 32			175 0	33 0	6 0	5 5	0·25
138·23	Guard gate							
148·00	Sturgeon Point							
156·19	Bridge 65—Wellington Street, Lindsay—Highway bascule	Branch (Sturgeon Lake to Port Perry)						
156·31	Bridge 66—Lindsay Street, fixed	13 0	10 8					
156·35	Lindsay—Lock			142 0	33 0	6 0	7 0	
156·89	Bridge 64—Lindsay foot bridge—fixed	11 0	9 4					
157·20	Bridge 67—Can. Nat. Rys.—High level	31 0	29 2					
157·87	Bridge 68—Ops—Highway fixed span	10 0	8 6					
183·00	Port Perry							
153·61	Fenelon Falls—Flight Lock 33			150 0	33 0	6 0	23 7	0·50
	Fenelon Falls—Flight Lock 34			134 0	33 0	6 0		
153·61	Bridge 36—Highway swing							
153·98	Bridge 37—Can. Nat. Rys.—Swing							
157·17	Rosedale—Lock 35			175 0	33 0	6 0	4 0	1·00
157·19	Emergency dam							
158·00	Bridge 38—Rosedale—Highway swing							
158·10	Entrance to Balsam Lake							
	(Balsam Lake—Summit level, 841·0 above M.S.L.)							
163·91	Guard gate—Balsam Lake							
165·24	Bridge 39—Victoria Road—Highway swing							
166·80	Bridge 40—Portage Road—High level	23 7	22 9					
167·88	Guard gate							
167·98	Bridge 41—Can. Nat. Rys.—High level	23 4	22 8					6·00

Trent Canal—Mileage and General Data—Con.

Miles from Trenton	Structure, Locality, etc.	Overhead Clearance		Locks				Canal prism
		Normal	Least recorded	Length between hollow quoins	Minimum width	Normal draught	Average lift	
		ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	Miles
169·26	Guard gate—Kirkfield							
169·36	Kirkfield—Lock 36—Hydraulic lift	24 10	24 1	140 0	33 0	6 0	49 0	.....
172·98	Bridge 42—High-level arch	28 1	27 6	.....	.....	.....	.....	.....
175·23	Bridge 43—Bolsover—Highway swing.							
176·65	Bridge 44—Boundary Road—Highway swing							
177·04	Township of Thorah—Lock 37	.....	.....	142 0	33 0	6 0	21 8½	6·00
178·05	Township of Mara—Lock 38	.....	.....	142 0	33 0	6 0	14 0	.....
179·07	Bridge 46—Kane's—Highway swing							
179·63	Township of Thorah—Lock 39	.....	.....	142 0	33 0	6 0	13 0	.....
180·09	Township of Thorah—Lock 40	.....	.....	142 0	33 0	6 0	14 0	3·00
180·74	Township of Thorah—Lock 41	.....	.....	142 0	33 0	6 0	11 6	.....
180·79	Bridge 47—Gamebridge—Highway swing							
181·70	Bridge 48—Can. Nat. Rys.—High level	22 8	21 10	.....	.....	.....	.....	.....
181·85	Bridge 49—Can. Nat. Rys.—Swing							
182·15	Bridge 50—Lakeshore Road—Highway swing.							
182·20	Entrance to Lake Simcoe							
	(Lake Simcoe Level—718·3 above M.S.L.)							
197·56	Bridge 51—Atherley road—Highway swing							
197·66	Bridge 52—Can. Nat. Rys.—Atherley Narrows—Swing							
208·24	Bridge 54—Muskoka Road—Highway swing							
209·14	Bridge 55—Can. Nat. Rys.—Washago swing							
209·87	Guard gate—Couchiching							
209·89	Couchiching—Lock 42	.....	.....	175 0	33 0	7 0	20 3	3·00
209·90	Bridge 56—Couchiching—Highway high-level	31 0	28 7	.....	.....	.....	.....	.....
212·73	Bridge 57—Hamlet—Highway swing							
222·40	Bridge 58—Can. Nat. Rys.—Ragged Rapids—High-level	34 0	32 8	.....	.....	.....	.....	.....
224·45	Swift Rapids Marine Railway	.....	.....	(60 0	13 6	4 0)	47 0	.....
228·07	Bridge 59—Can. Pac. Ry.—Severn Falls —High level	33 7	33 2	.....	.....	.....	.....	.....
232·45	Big Chute—Marine Railway	.....	.....	(60 0	13 6	4 0)	58 0	.....
240·55	Port Severn—Lock	.....	.....	100 0	25 0	6 0	12 0	.....
240·55	Bridge 60—Port Severn—Highway swing							
240·56	Entrance to Georgian Bay							
	Total	.....	.....	.....	.....	.....	.....	33·25

(Lake Huron—Mean level, 580·6 above M.S.L.
Standard low water 578·5 above M.S.L.)

The depth of water on lock sills varies with prevailing water levels. The depths at locks opening on Lake Ontario, Lake Simcoe, and Georgian Bay have been as low as the following during the navigation season:—

Lock 1, Trenton.....7′4″ on October 28, 1934.
Lock 41, Gamebridge.....6′3″ on October 6, 1949.
Lock 42, Couchiching.....7′8″ on October 17, 1929.
Lock at Port Severn.....6′2″ on August 21, 1926.

NEW NAVIGATION CHARTS

The Department of Transport issues navigation charts for the Trent Canal. The following table indicates the scale, the price, and the section of the Canal covered by each of them. They are obtainable postpaid from the Superintending Engineer, Trent Canal, Peterborough, Ontario.

No. 2010—General Chart. Bay of Quinte to Georgian Bay.
Scale 1 in. = 4 miles.....Price $0.50

No. 2011—Bay of Quinte to Rice Lake.
Scale 1 in. = 3,000 ft.....Price .50

No. 2012—Rice Lake to Buckhorn Lake.
Scale 1 in. = 3,000 ft.....Price .50

No. 2012A—Junction of Clear and Stony Lakes.
Scale 1 in. = 2,000 ft.....There is no charge for Chart No. 2012A which is included with Chart No. 2012.

No. 2013—Buckhorn Lake to Lake Simcoe.
Scale 1 in. = 3,000 ft.....Price .50

No. 2014—Lake Simcoe to Georgian Bay.
Scale 1 in. = 3,000 ft.....Price .50

In **Canada** remittance should be made by MONEY ORDER or ACCEPTED CHEQUE, payable to THE RECEIVER GENERAL OF CANADA.

From United States, remittance should be made by MONEY ORDER or NEW YORK DRAFT, payable to THE RECEIVER GENERAL OF CANADA.

If requested and 20 cents additional is enclosed, the charts will be sent by "Registered Mail" or by "Special Delivery", or they will be sent "Registered" by "Special Delivery" if so required, and 30 cents additional is enclosed.

Those desirous of having charts sent to the United States by "Special Delivery" should remit an additional amount of 45 cents over the rates given above in order to cover the cost of First Class Mail, which is necessary in this case.

A limited supply of the old type charts, consisting of 26 sheets, priced at 50 cents each ($12.00 per set) is still available and will be sold on request as long as the supply lasts.

Hydrographic Charts of Canal Areas

Chart No.	Title	Scale, Inches to Nautical Mile	Natural Scale 1:	Latest Edition
	St. Peters Canal, Cape Breton Island			
4336	St. Peters Bay	4·0	18,000	Nov. 1943
4335	Strait of Canso and Approaches	1·0	76,400	Aug. 1943
	St Ours Lock and Chambly Canal (Richelieu River)			
1325	Richelieu River, Sorel to Beloeil Bridge	2·3	31,700	May 1951
1326	Richelieu River, Chambly Basin to Lake Champlain	2·3	31,700	May 1951
	Lachine Canal			
1340	Montreal Harbour (shows lower entrance to canal)	6·0	12,000	May 1952
1343	Currents in Montreal Harbour	6·0	12,000	Mar. 1942
1450	Lake St. Louis (shows upper entrance to canal)	2·9	25,200	Aug. 1949
1449	Lachine to Coteau Landing and Carillon (shows upper entrance to Canal)	1·5	48,000	Mar. 1952
	St. Annes, Carillon and Grenville Canals (Ottawa River)			
1450	Lake St. Louis (shows St. Annes lock)	2·9	25,200	Aug. 1949
1449	Lachine to Coteau Landing and Carillon (shows Carillon Canal)	1·5	48,000	Mar. 1952
1541	Ottawa River, Carillon to Wendover (shows Grenville and Carillon Canals)	3·0	24,000	Mar. 1951
	Rideau Canal			
1542	Ottawa River, Wendover to Ottawa (shows entrance to canal)	3·0	24,000	Mar. 1951
1575	Rideau Lakes Route, Kingston to Narrows Lock	2·0	36,000	April 1947
1576	Rideau Lakes Route, Narrows Lock to Ottawa	2·0	36,000	April 1947
1459	Kingston Harbour and Approaches (shows entrance to canal system)	6·0	12,000	May 1950
1477	Howe Island to Kingston (shows entrance to canal system)	2·2	32,500	July 1950
	Trent Canal			
2053	Trenton and Approaches (shows entrance to canal system)	6·0	12,000	April 1950
2069	Bay of Quinte (shows entrance to canal system)	1·2	60,600	Oct. 1946
2010	Trent-Severn Waterway, Bay of Quinte to Georgian Bay	0·29	253,400	Mar. 1950
2011	Trent-Severn Waterway, Bay of Quinte to Rice Lake	2·0	36,000	Feb. 1950
2012	Trent-Severn Waterway, Rice Lake to Buchkorn Lake	2·0	36,000	Feb. 1950
2013	Trent-Severn Waterway, Buckhorn Lake to Lake Simcoe	2·0	36,000	Feb. 1950
2014	Trent-Severn Waterway, Lake Simcoe to Georgian Bay	2·0	36,000	Feb. 1950
2217	Port Severn to Present Island (shows entrance to canal system)	4·0	18,000	April 1952
2283	Waubaushene to Western Islands (shows entrance to canal system)	1·5	48,900	Sept. 1948
	Murray Canal			
2069	Bay of Quinte	1·2	60,600	Oct. 1946
2071	Presqu'ile Bay (shows upper entrance to canal)	4·0	18,200	Feb. 1950
2061	Scotch Bonnet Island to Cobourg	1·0	72,900	Aug. 1949

Hydrographic Charts of Canal Areas—Con.

Chart No.	Title	Scale, Inches to Nautical Mile	Natural Scale 1:	Latest Edition
	SOULANGES CANAL			
1450	Lake St. Louis (shows lower entrance to canal)	2·9	25,200	Aug. 1949
1449	Lachine to Coteau Landing and Carillon	1·5	48,000	Mar., 1952
1452	Lake St. Francis, Coteau Landing to Lancaster Bar (shows upper entrance to canal)	2·4	30,000	Aug. 1948
1451	Lake St. Francis, general chart (shows upper entrance to canal)	1·5	48,000	July 1948
	CORNWALL AND WILLIAMSBURG CANALS			
1455	Cornwall to Weaver Point	2·4	30,000	Mar. 1948
1456	Weaver Point to Cardinal	2·4	30,000	Mar. 1948
	WELLAND SHIP CANAL			
2042	Welland Ship Canal, Port Weller to Port Colborne	6·0	12,000	Sept. 1950
2063	Toronto to Niagara River	1·0	73,000	Sept. 1947
2174	Port Colborne	6·0	12,000	April 1952

The above nautical charts (except charts 1575, 1576, 2010, 2011, 2012, 2013 and 2014 which are 50 cents) are priced at 75 cents per copy. Payment for same must be made in advance, by postal or express money order (postage stamps will not be accepted) made payable to the order of the Receiver General of Canada and addressed to the

DOMINION HYDROGRAPHER,
CANADIAN HYDROGRAPHIC SERVICE,
SURVEYS AND MAPPING BRANCH,
DEPARTMENT OF MINES AND TECHNICAL SURVEYS,
No. 8 TEMPORARY BUILDING,
OTTAWA, CANADA.

Canadian Hydrographic Service Charts may be obtained at the following ports

St. John's Nfld.	Dicks & Co. Ltd. Ayre & Sons Ltd., 231 Water St.
Halifax, N.S.	Kelvin and Hughes (Canada) Ltd., 16½ Hollis St. Gabriel Aero-Marine Instruments Ltd., 126 Hollis St.
Yarmouth, N.S.	M. G. Frampton, Marine Exchange, Water St.
Louisburg, N.S.	L. H. Cann Co. Ltd. Lewis & Company.
Sydney, N.S.	C. & G. MacLeod Ltd., 361 Charlotte St.
Saint John, N.B.	Kelvin and Hughes (Canada) Ltd., 93 Prince William St. Gabriel Aero-Marine Instruments Ltd., 177 Prince William St. The Agent, Department of Transport, Customs House.
Charlottetown, P.E.I.	A. Kennedy & Co. Ltd., 32 Queen St.
Quebec, P.Q.	T. J. Moore & Co. Ltd., 122 Cote de la Montagne. Chief Signal Clerk, Marine Signal Service, Room 306, Custom House Bldg., 2 St. Andre St.
St. Johns, P.Q.	Customs House, Department of National Revenue.
Sorel, P.Q.	District Marine Agent, Department of Transport.
Montreal, P.Q.	Kelvin and Hughes (Canada) Ltd., 401 McGill St. R. H. Samson Co., 356–358 Youville St. Gabriel Aero-Marine Instruments Ltd., 461 McGill St. Harrison Co., 1448 St. Catherine St. W. Telecommunications Division, Department of Transport, 901 Bleury St.
Ottawa, Ont.	Canadian Hydrographic Service, No. 8 Temporary Bldg. Kelvin and Hughes (Canada) Ltd., 527 Sussex St.

Canadian Hydrographic Service Charts may be obtained at the following ports—Con.

Cornwall, Ont.	Kyte's. 217 Pitt Street.
Gananoque, Ont.	I. W. Bennett & Son Ltd.
Kingston, Ont.	Millan Bros., 53–55 Princess St.
Picton, Ont.	Publow Marine Supplies.
Toronto, Ont.	Boating Magazine, 347 Adelaide St. W.
Port Colborne, Ont.	Stan Kennedy, 162 West St. Bell Marine & Mill Supply, opposite Lock 8. Welland Ship Canal, Administration Bldg., Lock 8.
Sarnia, Ont.	Randolph's, 222 N. Christina St.
Midland, Ont.	Midland Boat Works.
Parry Sound, Ont.	The Agent, Department of Transport.
Killarney, Ont.	T. H. Jackman, General Merchant.
Little Current, Ont.	Turners' (Manitoulin) Ltd.
Sault Ste. Marie, Ont.	Superintending Engineer, Sault Ste. Marie Canal.
Port Arthur, Ont.	Lowerys Limited, Cumberland and Park Sts.
Fort William, Ont.	Rutledge Stationery Ltd., 512 Victoria Ave.
Kenora, Ont.	Henry's Book & Gift Store, 213 First St. S. Johnson's Pharmacy.

CANALS OF CANADA

Name	Location	Length in Miles	Number of Locks	Locks		
				Minimum dimensions		
				Length between hollow quoins	Minimum width	Normal draught
				Feet	Feet	Feet
St. Lawrence and Great Lakes						
Lachine	Montreal to Lachine	8·74	5	270	45	14
Soulanges	Cascades Point to Coteau Landing	14·67	5	280	46	14
Cornwall	Cornwall to Dickinson Landing	11·00	6	270	43·67	14
Farran Point	Farran Point Rapids	1·28	1	800	50	16
Rapide Plat	Rapide Plat, Morrisburg	3·89	2	270	45	14
Galop	Iroquois to Cardinal	7·36	3	270	45	14
Welland Ship	Port Weller, Lake Ontario, to Port Colborne, Lake Erie	27·60	8	859	80	23·5
Sault Ste. Marie	St. Marys Rapids, Sault Ste. Marie	1·38	1	900	60	18·25
Atlantic Ocean to Bras d'Or Lakes						
St. Peters	St. Peters Bay to Bras d'Or Lakes, Cape Breton, N.S.	0·50	1	300	48	17
Richelieu River						
St. Ours	St. Ours, Que	0·12	1	339	45	12
Chambly	Chambly to St. Johns, Que	11·78	9	120·5	23·35	6·5
Ottawa and Rideau Rivers						
Ste. Anne	Junction of St. Lawrence and Ottawa rivers	0·12	1	200	45	9
Carillon	Carillon Rapids, Ottawa River	0·94	2	200	45	9
Grenville	Long Sault Rapids, Ottawa River	5·94	5	200	45	9
Rideau	Ottawa to Kingston	123·53	47	134	33	5·5
	Rideau Lake to Perth (Tay Branch)	6·82	2	134	33	5·5
Lake Ontario to Georgian Bay						
Trent	Trenton to Peterborough lock, Peterborough	88·74	18	175	33	8*
	Peterborough lock to Swift Rapids	135·71	24	134	33	6
	Swift Rapids to Big Chute	8·00	Marine	Railways		4
	Big Chute to Port Severn	8·11	1	100	25	6
	Sturgeon Lake to Lindsay (Scugog Branch)	10·00	1	142	33	6
	Lindsay to Port Perry (Scugog Branch)	25·00	None	.....	.....	4·5
Murray	Isthmus of Murray, Bay of Quinte	7·53	None	.....	.....	8·5†
	Total	508·76				

* Twelve hours notice must be given by vessels of more than 6 feet draught.
† With Lake Ontario at Elev. 243.

Dates of Opening and Closing of Canals

FOR THE SEASONS OF 1948, 1949, 1950, 1951, AND 1952

Canals	1948		1949		1950		1951		1952	
	Opened	Closed	Opened	Closed	Opened	Closed	Opened	Closed	Opened	Closed
Lachine	April 22	Dec. 5	April 18	Dec. 4	April 22	Dec. 7	April 21	Dec. 5	April 20	Dec. 4
Soulanges	" 22	" 5	" 18	" 4	" 22	" 6	" 21	" 5	" 18	" 4
St. Ours	" 26	Nov. 27	" 29	Nov. 26	" 29	Nov. 25	" 30	Nov. 24	" 30	Nov. 22
Chambly	" 26	" 27	" 29	" 26	" 29	" 22	" 30	" 24	" 30	" 22
Ste. Anne	" 22	" 30	" 18	" 30	" 22	" 30	" 21	" 30	" 21	" 29
Carillon and Grenville	May 3	" 20	May 2	" 26	May 1	" 25	May 1	" 24	May 1	" 22
Cornwall	April 22	Dec. 5	April 18	Dec. 7	April 22	Dec. 7	April 21	Dec. 5	April 19	Dec. 6
Williamsburg—										
Farran Point	" 22	" 5	" 18	" 7	" 22	" 7	" 21	" 5	" 19	" 6
Rapide Plat	" 22	" 5	" 18	" 7	" 22	" 7	" 21	" 5	" 19	" 6
Galop	" 22	" 5	" 18	" 7	" 22	" 7	" 21	" 5	" 19	" 6
Welland Ship	" 5	" 15	" 1	" 15	" 7	" 18	" 7	" 17	" 1	" 15
Sault Ste. Marie	" 15	" 15	" 11	" 15	" 15	" 15	" 30	" 15	" 1	" 13
St. Peters	" 19	Jan. 8/49	" 18	Jan. 14/50	" 29	Jan. 13/51	" 24	Jan. 12/52	" 26	Jan. 10/53
Rideau—										
Lock 1 to 8 (Ottawa)	May 1	Nov. 17	May 2	Nov. 16	May 1	Oct. 18*	May 1	Nov. 21	May 1	Nov. 20
Pretoria Ave. Bridge to Lock 12, Hogsback	" 1	" 17	" 2	" 16	" 1	Nov. 22	" 1	" 21	" 1	" 20
Lock 13 to 31—Black Rapids to Smiths Falls	" 1	" 19	" 2	" 19	" 1	" 23	" 1	" 21	" 1	" 21
Lock 32 (Poonamalie)	" 1	" 22	" 2	" 19	" 1	" 23	" 1	" 21	" 1	" 24
Lock 33 to Perth (Tay Canal)	" 1	" 17	" 2	" 12	" 1	" 20	" 1	" 21	" 1	" 15
Rideau Ferry Bridge	" 1	" 22	" 2	" 19	" 1	" 23	" 1	" 21	" 1	" 24
Lock 35 to 49—The Narrows to Kingston Mills	" 1	" 19	" 2	" 19	" 1	" 23	" 1	" 21	" 1	" 20
Trent—										
Trenton Bridge	April 15	" 15	April 7	Oct. 27	April 15	" 11	" 15	" 15	April 15	" 15
Lock 1 to Balsam Lake	May 15	Oct. 15	May 16	Nov. 23	May 15	" 7	" 15	Oct. 15	May 15	Oct. 15
Balsam Lake to Lake Simcoe	" 15	" 15	" 16	" 23	" 15	" 7	" 15	" 15	" 15	" 15
Lake Simcoe to Georgian Bay	" 15	" 15	" 16	" 25	" 15	" 22	" 15	" 15	" 15	" 15
Scugog River and Lindsay Lock	" 15	" 15	" 16	" 23	" 15	" 7	" 15	" 15	" 15	" 15
Murray	April 1	Dec. 10	April 7	Dec. 10	April 16	Dec. 9	April 9	Dec. 9	April 7	Dec. 9

* Mackenzie King Bridge under construction.

TABLE OF DISTANCES

ON MAIN ROUTE

MONTREAL TO FORT WILLIAM

(Statute Miles)

—	Fort William	Sault Ste. Marie	Sarnia	Windsor	Port Colborne	Welland	St. Catharines	Port Weller	Toronto	Kingston	Brockville	Prescott	Head of Galop Canal	Cardinal	Iroquois	Morrisburg	Cornwall	Coteau Landing	Cascades Point	Lachine
Montreal*	1215	943	674	612	367	359	346	342	338	182	132	120	112	110	105	97	70	39	25	9
Lachine	1206	934	665	603	358	350	337	333	329	173	123	111	103	101	96	88	61	30	16	
Cascades Point	1190	918	649	587	342	334	321	317	313	157	107	95	87	85	80	72	45	14		
Coteau Landing	1176	904	635	573	328	320	307	303	299	143	93	81	73	71	66	58	31			
Cornwall	1145	873	604	542	297	289	276	272	268	112	62	50	42	40	35	27				
Morrisburg	1118	846	577	515	270	262	249	245	241	85	35	23	15	13	8					
Iroquois	1110	838	569	507	262	254	241	237	233	77	27	15	7	5						
Cardinal	1105	833	564	502	257	249	236	232	228	72	22	10	2							
Head of Galop Canal	1103	831	562	500	255	247	234	230	226	70	20	8								
Prescott	1095	823	554	492	247	239	226	222	218	62	12									
Brockville	1083	811	542	480	235	227	214	210	206	50										
Kingston	1033	761	492	430	185	177	164	160	156											
Toronto	899	627	358	296	51	43	30	26												
Port Weller†	873	601	332	270	25	17	4													
St. Catharines	869	597	328	266	21	13														
Welland	856	584	315	253	8															
Port Colborne	848	576	307	245																
Windsor	603	331	62																	
Sarnia	541	269																		
Sault Ste. Marie	272																			

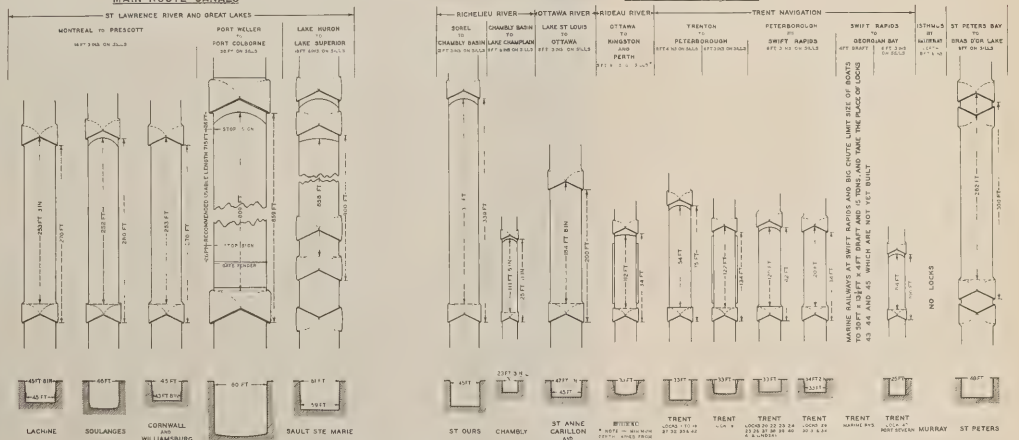
* Lower entrance Lachine Canal.
† Foot of Lock No. 1.

DEPARTMENT OF TRANSPORT

PLANS AND SECTIONS SHOWING

DIMENSIONS OF THE SMALLEST LOCK ON EACH OF THE CANADIAN CANAL SYSTEMS

(EXCLUDING SUPERSEDED LOCKS)



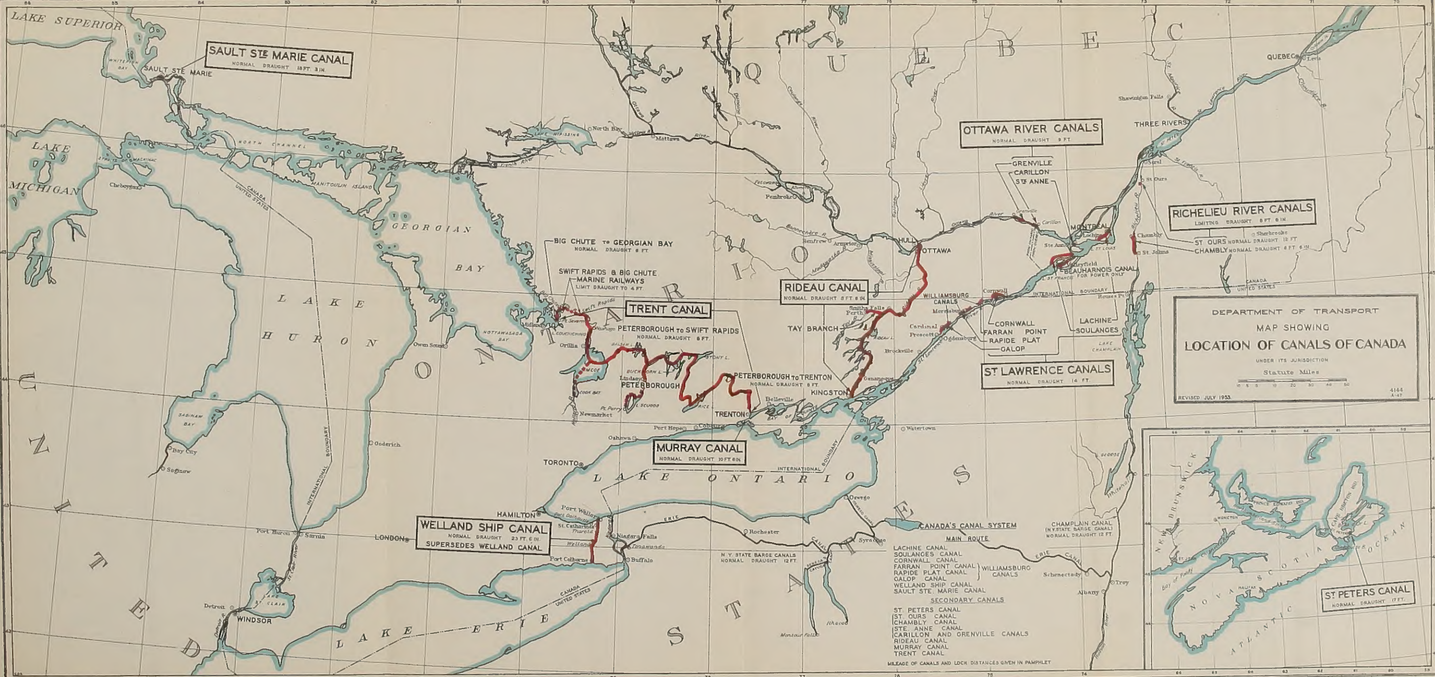
SLIGHT SHIFTING OF MASONRY IN SOME LOCK WALLS HAS SOMEWHAT NARROWED THE CLEAR WIDTH OF LOCKS IN CERTAIN SPOTS

LOCK 17 ON THE CORNWALL CANAL IS THE MOST NOTABLE IN THIS RESPECT AND IS THE LIMITING LOCK OF THE ST LAWRENCE SYSTEM

DETAILED INFORMATION RESPECTING OVERHEAD CLEARANCES AND AVAILABLE WIDTHS AND DEPTHS OF CANAL CHANNELS WILL BE FOUND IN THE TEXT

C85

4360
2-2


DEPARTMENT OF TRANSPORT
MAP SHOWING
LOCATION OF CANALS OF CANADA
UNDER ITS JURISDICTION
Statute Miles
REVISED JULY 1953
SAULT STE MARIE CANAL
NORMAL DRAUGHT 18 FT. 3 IN.
OTTAWA RIVER CANALS
NORMAL DRAUGHT 9 FT.
GRENVILLE
CARILLON
STE ANNE
RICHELIEU RIVER CANALS
LIMITING DRAUGHT 6 FT. 6 IN.
ST OURS NORMAL DRAUGHT 12 FT.
CHAMBLY NORMAL DRAUGHT 6 FT. 6 IN.
BIG CHUTE TO GEORGIAN BAY
NORMAL DRAUGHT 6 FT.
SWIFT RAPIDS & BIG CHUTE
MARINE RAILWAYS
LIMIT DRAUGHT TO 4 FT.
TRENT CANAL
PETERBOROUGH TO SWIFT RAPIDS
NORMAL DRAUGHT 6 FT.
PETERBOROUGH TO TRENTON
NORMAL DRAUGHT 6 FT.
RIDEAU CANAL
NORMAL DRAUGHT 5 FT. 6 IN.
TAY BRANCH
WILLIAMSBURG CANALS
CORNWALL
FARRAN POINT
RAPIDE PLAT
GALOP
LACHINE
SOULANGES
BEAUHARNOIS CANAL
FOR POWER ONLY
ST LAWRENCE CANALS
NORMAL DRAUGHT 14 FT.
MURRAY CANAL
NORMAL DRAUGHT 10 FT. 6 IN.
WELLAND SHIP CANAL
NORMAL DRAUGHT 23 FT. 6 IN.
SUPERSEDES WELLAND CANAL
N.Y. STATE BARGE CANALS
NORMAL DRAUGHT 12 FT.
CHAMPLAIN CANAL
(N.Y. STATE BARGE CANAL)
NORMAL DRAUGHT 12 FT.
ST PETERS CANAL
NORMAL DRAUGHT 17 FT.
CANADA'S CANAL SYSTEM
MAIN ROUTE
LACHINE CANAL
SOULANGES CANAL
CORNWALL CANAL
FARRAN POINT CANAL
RAPIDE PLAT CANAL
GALOP CANAL
WILLIAMSBURG CANALS
WELLAND SHIP CANAL
SAULT STE. MARIE CANAL
SECONDARY CANALS
ST. PETERS CANAL
ST. OURS CANAL
CHAMBLY CANAL
STE. ANNE CANAL
CARILLON AND GRENVILLE CANALS
RIDEAU CANAL
MURRAY CANAL
TRENT CANAL
MILEAGE OF CANALS AND LOCK DISTANCES GIVEN IN PAMPHLET
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
GEORGIAN BAY
LAKE ONTARIO
LAKE ERIE
QUEBEC
ONTARIO
UNITED STATES
MONTREAL
OTTAWA
QUEBEC
THREE RIVERS
KINGSTON
TRENTON
PETERBOROUGH
TORONTO
HAMILTON
LONDON
WINDSOR
SAULT STE MARIE
NOVA SCOTIA
ATLANTIC OCEAN
INTERNATIONAL BOUNDARY